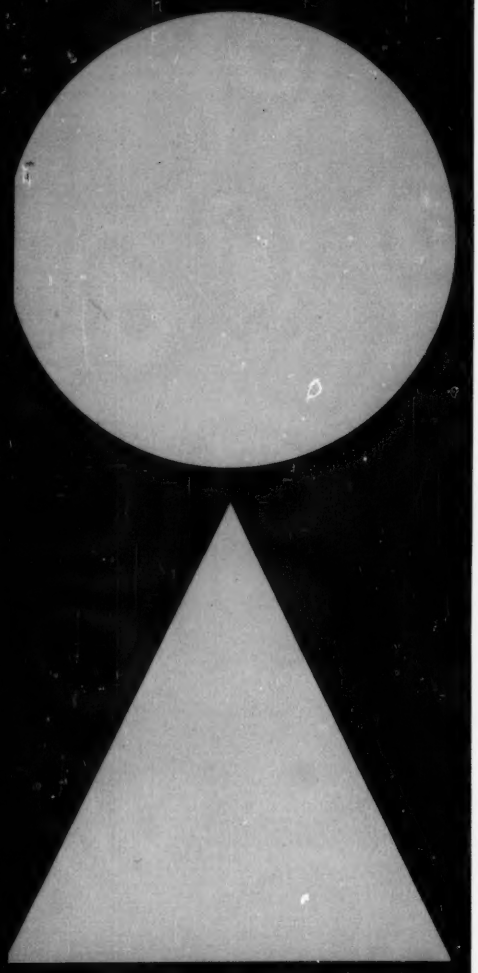
DECEMBER 28, 1959

STEEL
The Metalworking Weekly

A PENTON PUBLICATION



How to Develop Creative Talent

First task is to find the creative people. Typical test questions present shapes like those above and ask for as many variations in their design and juxtaposition as can be imagined. Test yourself! How many variations can you come up with? Now turn to Page 53 and check results that indicate the kind of creative person industry is seeking.

Public Pressure Mounts in Steel Case

Trade Rivalry—Free World vs. Reds—Spurs Asia's Industrial Development

GE Upgrades Its First Line Managers

Induction Heating Tackles More Jobs; Here's How and When to Use It

Numerical Control Whips Tough Jobs

Merchant Bar Sales Headed for Peak

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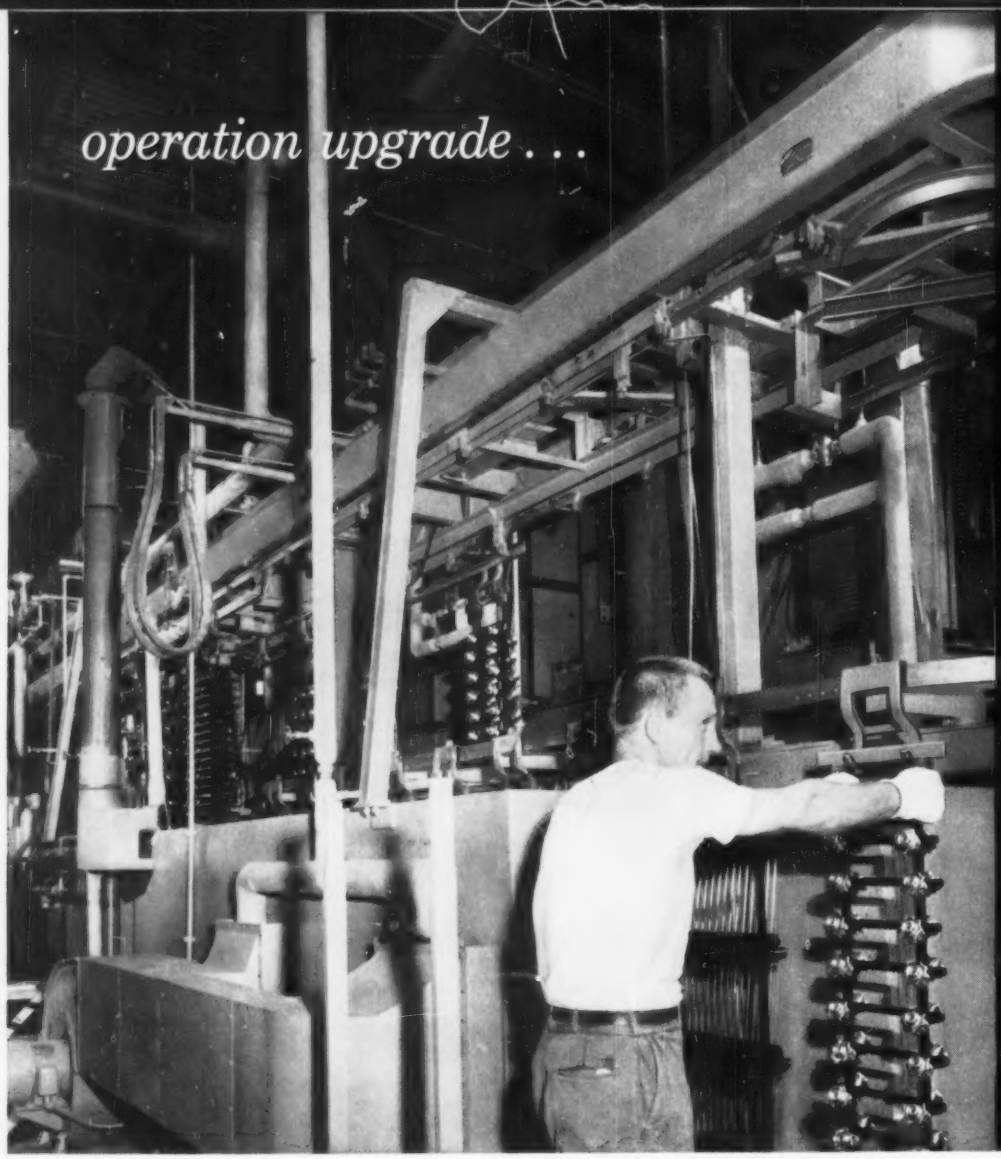

Udylite Cyclemaster in operation at American Standard Plumbing and Heating Division, Cincinnati, Ohio

CYCLEMASTER has the answer . . .

This Udylite Cyclemaster, which is another way to say low cost automation, represents six important areas of improvement in American Standard's plating production.

- quality control to meet their most exacting top standards
- production volume far exceeding their expectations
- nearly 50% savings in floor space used for the operation
- almost total elimination of rejected pieces
- ultra-sonic cleaning to eliminate complicated de-greasing
- Plastisol coated tanks for minimum maintenance . . . long life

Learn how Cyclemaster can perform with equally promising revisions of your profit picture while improving your product whatever it may be. To find out how so *much* can be accomplished for so *little*, ask your Udylite representative, today!

the **udylite** corporation

detroit 11, michigan • world's largest plating supplier

on the west coast: the L. H. Butcher Company

This Week in STEEL

The Metalworking Weekly

December 28, 1959 Vol. 145—No. 26

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Index available semiannually.

STEEL is also indexed by Engineering Index, 29 W. 39th St., New York 18, N. Y.

STEEL, the metalworking weekly, is selectively distributed without charge to qualified management personnel with administrative, production, engineering, or purchasing functions in U. S. metalworking plants employing 20 or more. Those unable to qualify, or those wishing home delivered copies, may purchase copies at these rates: U. S. and possessions and Canada, $10 a year; all other countries, $20 a year; single copies, 50 cents. Metalworking Yearbook issue, $2. Published every Monday and copyright 1959 by The Penton Publishing Co., Penton Bldg., Cleveland 13, Ohio. Accepted as controlled circulation publication at Cleveland, Ohio.

Metalworking Pulse ▶

TURN

Metalworking Pulse

INDUSTRIAL PRODUCTION INDEX

	WEEK ENDED DEC. 19	PREVIOUS WEEK	MONTH AGO	YEAR AGO
(1947-49=100) Based on steel output, electric power output, freight carloadings, auto assemblies.	181† †Preliminary.	173	158	158

Rising 8 points, STEEL's industrial production index reached a preliminary 181 in the latest week. That's an all-time high. With seasonal downtrends in the offing for two of the components, it is not likely that another peak will be set until spring.

Details on Page 63

U. S. PASSENGER CAR PRODUCTION

	WEEK ENDED DEC. 26	PREVIOUS WEEK	MONTH AGO	YEAR AGO
Number of units assembled ..... (Source: Ward's Automotive Reports.)	105,000* *Estimated.	149,707† †Preliminary.	46,740	104,907

Mainly on the strength of renewed activity at General Motors Corp., auto production bounced back to the highest level in many weeks during the period ended Dec. 19 before tapering off during the Christmas holiday week.

Details on Page 60

NATIONAL STEEL INGOT PRODUCTION

	WEEK ENDED DEC. 27	PREVIOUS WEEK	MONTH AGO	YEAR AGO
Net tons (thousands)	2,647*	2,726	2,540	1,840
Index (1947-49=100)	164.8*	169.7	158.1	114.5
Percentage of capacity	93.5*	96.3	89.7	68.2

*Estimated by STEEL; comparative figures reported by AISI.

Steelmaking operations held at an unusually high rate for the Christmas holiday week with the tonnage only slightly below the all-time high. Mills are pressing to get out as much metal as possible to alleviate the shortage.

Details on Page 93

STEEL SCRAP PRICE COMPOSITE

	DEC. 23	WEEK AGO	MONTH AGO	YEAR AGO
Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.	$41.33	$41.33	$43.50	$39.67

The scrap market closed the year with prices only about $2 above the previous year's final quotations. The composite on No. 1 heavy ranged from a low of $33.33 in mid-May to a high of $45.33 in early November.

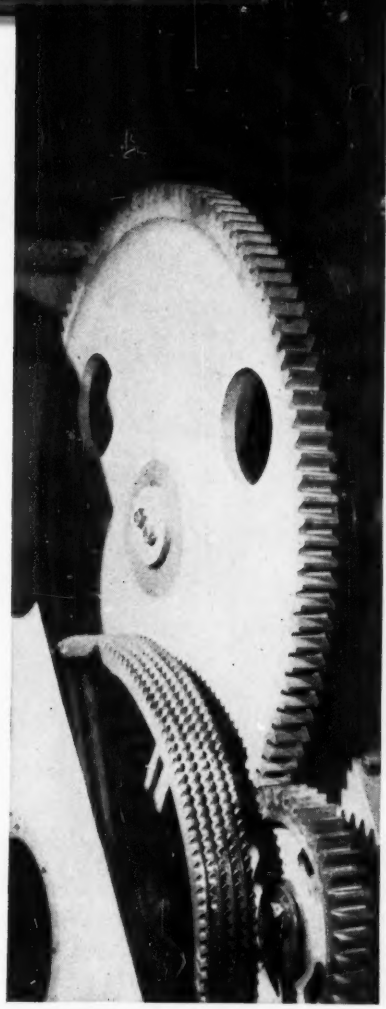
Details on Page 103

FINISHED STEEL PRICE INDEX

	DEC. 22	WEEK AGO	MONTH AGO	YEAR AGO
Based on Bureau of Labor Statistics data (1947-49=100)	186.8	186.8	186.8	186.9

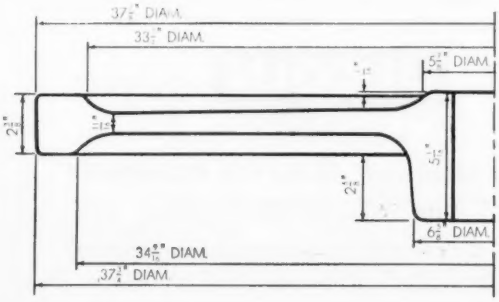
No major price revision was posted by domestic producers in 1959. Adjustments were confined in the principal products to coated materials to reflect changes in zinc prices.

Details on Page 94



GEAR *installed in hoist mechanism of Koehring Company power shovel.*

EXCELLENT *response to induction hardening? Take a look!*



This gear now costs $35.24 less,

THANKS TO BETHLEHEM CIRCULAR FORGINGS

"We are also very pleased with product machining properties, freedom from defects in the tooth area, and excellent response of the forging to heat treatment."

KOEHRING COMPANY, MILWAUKEE, WISCONSIN
manufacturers of construction equipment

Koehring Co. previously machined this gear from a cast gear blank. Today they machine it from an impression-die steel forging made on Bethlehem's unique Slick Mill. They save $29.24 in first cost, plus $6.00 in machining costs! (Turning, boring, facing, and hobbing teeth.)

Here's how we do it

The answer, of course, lies in Bethlehem's Slick Mill—the only one of its kind in the country. Quick die set-up (only 15 minutes)—quick operation (just one minute to forge and roll a circular product)—low die charges (⅓ to ½ less than conventional impression dies)—and less steel needed (utilizing the principle of forging design, the Slick Mill can produce lighter-weight sections without sacrificing strength) . . . all these add up to important savings. At the same time, the process insures *soundness, excellent grain flow,* and *machinability.*

Bethlehem's Slick Mill saves the Koehring Company $35.24 *per gear.* How much can it save you?

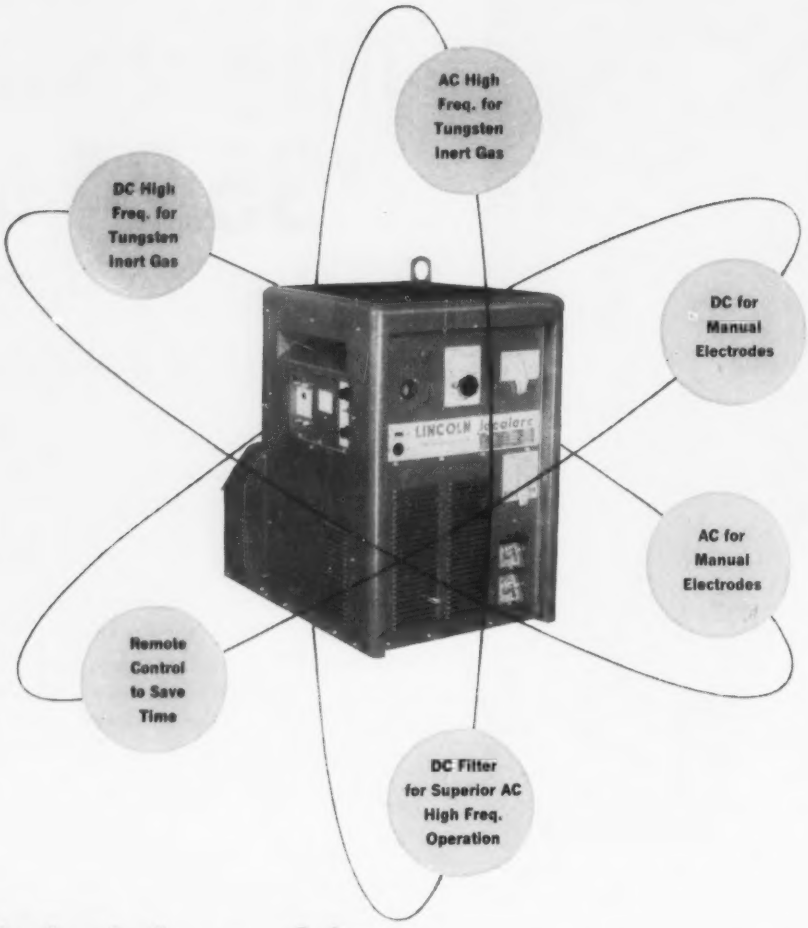
Bethlehem Circular Forgings are available in carbon, alloy, or stainless steels, as well as certain heat-resistant grades. 10 to 48-in. OD. 100 to 2,000 lb. As-rolled, or rough-machined to specifications. Call or write the Bethlehem sales office nearest you for full details.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

NOTICE *the thin disc shape on this 395-lb gear blank. A cinch on the Slick Mill!*

BETHLEHEM STEEL


AC High Freq. for Tungsten Inert Gas
DC High Freq. for Tungsten Inert Gas
DC for Manual Electrodes
AC for Manual Electrodes
Remote Control to Save Time
DC Filter for Superior AC High Freq. Operation

Weld little jobs or big . . . use inert gas or stick electrode . . . on AC or DC welding current, with "IDEALARC TIG"

At last, here is a welder which gives complete versatility to maintenance-welding departments or to job shop operations. The "Idealarc TIG", equipped with high-frequency and water and gas controls can be used for welding stainless or aluminum. With just a flick of a switch, the same machine can do production welding with AC stick electrodes or pipe welding on DC.

But, if your operation does not require complete versatility, you can still have the superior welding qualities of the "Idealarc TIG" without all the optional extras. That's because Lincoln lets you select (and pay for), just the features you need.

The NEMA-rated "TIG" model has welding current ranges of 10-450 amps on AC and 10-375 amps on DC. For complete information, write to us for Bulletin 4608.1.

Price:

$1041 (in Zone 1)

COMPLETE WITH:

- AC and DC Current Selection
- High Frequency
- Gas and Water Controls
- Balanced Wave Filter
- Power Factor Correction
- Remote Current Control

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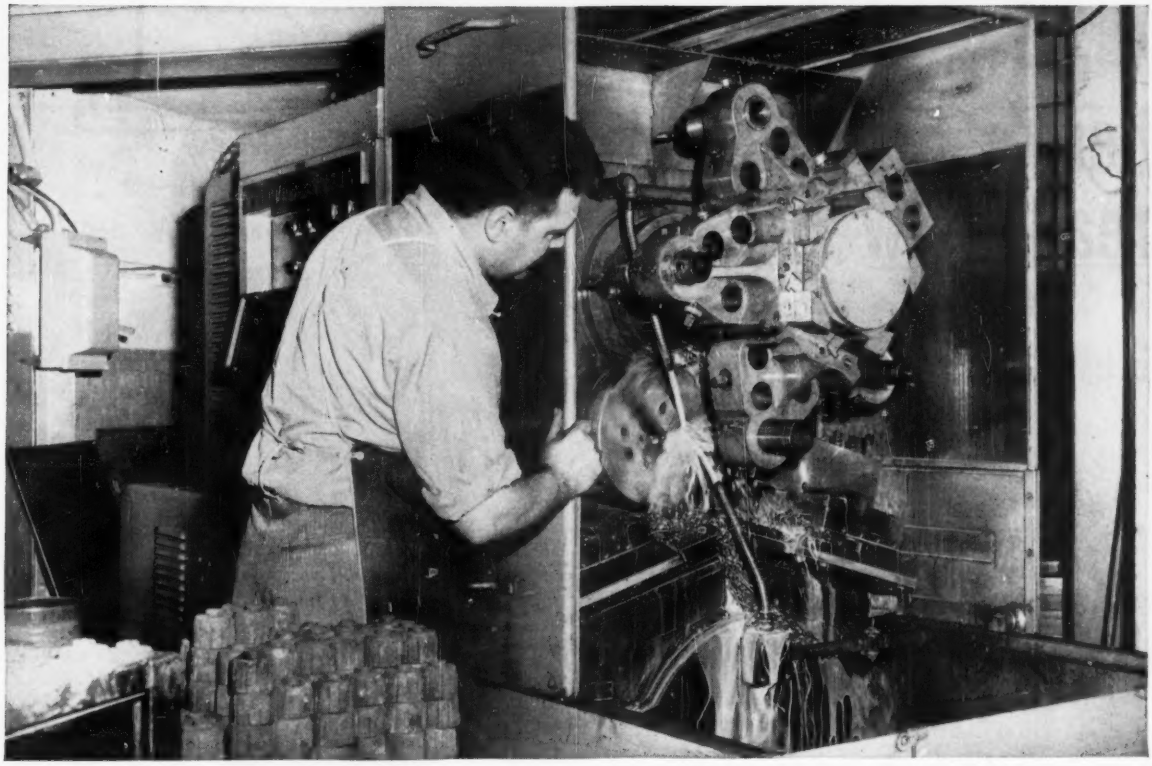
THE LINCOLN ELECTRIC COMPANY

Dept. 1660, Cleveland 17, Ohio

The world's leading manufacturer of arc welders and electrodes, ac motors and battery chargers.



If this isn't the world's best investment—what is?

HIGHLY PRODUCTIVE machine tools have long been recognized as one of the best investments any metalworking company can make.

And when a standard-designed machine tool pays for itself in less than a year, it's an investment that's hard to beat!

Two Warner & Swasey 2 AC Automatics did just that for The Thew Shovel Company, Lorain, Ohio. They turned in cost savings from 47% to 77% machining 38 different cast and forged steel parts for Lorain power shovels and cranes. Annual dollar savings exceeded the cost of both machines plus tooling!

Lot sizes averaged about 200 pieces—ranging from 36 to 2,000—demonstrating the fast setup features of these Warner & Swasey Automatics. Their simplicity of operation permits grouping machines so each 2 AC operator can also handle second operation work on adjacent turret lathes—an additional saving not included in the figures above.

On many jobs in your own plant—some you may think of as strictly "turret lathe jobs"—Warner & Swasey Single Spindle Automatics can speed production, cut floor-to-floor time, and slash machining costs. Our Field Representative will be glad to show you exactly how!

WARNER & SWASEY
Cleveland
PRECISION MACHINERY SINCE 1880

YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS ... WITH A WARNER & SWASEY

here's the really new

Cleveland Worm and Gear

SPEED REDUCER

It was Designed to Provide: High Horsepower in a Smaller Unit • Centrifugally Cast Bronze Gears • Alloy Steel Worms Heat Treated By An Exclusive Process for Carrying Higher Loads • Fan Cooling for More Efficient Operation • Maximum Overhung Load-Carrying Capacity • Ribbed Housing for Maximum Strength and Heat Dissipation • Modern, Streamlined Design to Enhance Your Machine's Appearance.

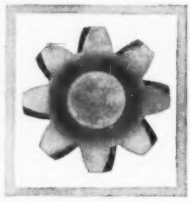
Cleveland's new speed reducer line meets AGMA Standard 440.03 — which permits higher horsepower and torque ratings — provides you speed reduction at savings of 50% or more on cost per horsepower. All this, with no deviation from Cleveland's standards of quality and dependability.

Remember, this strikingly new line of fan-cooled reducers — now available from one to forty horsepower — incorporates all the design knowledge gained by Cleveland's engineers over the past 47 years — plus all the advantages of modern metallurgical techniques and advanced manufacturing processes. Consult your Cleveland Representative for the complete story on this new speed reducer — or write us direct for Bulletin No. 405. It details input horsepower and output torque ratings, service factors, application and load classifications, as well as general over-all dimensions. **The Cleveland Worm & Gear Company, 3270 East 80th Street, Cleveland 4, Ohio.**

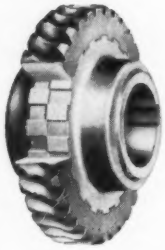
A subsidiary of
Eaton Manufacturing Company
Affiliate: The Farval Corporation

CLEVELAND
Worm Gear
Speed Reducers

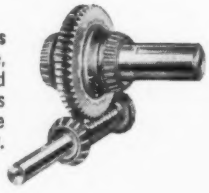
Check these new exclusive Cleveland features



Cleveland's Worm's, heat-treated by an exclusive process, possess a high degree of hardness throughout their entire thread thickness — and well below the worm's root diameter. This gives maximum thread strength and resistance to wear without losing the advantage of a tough core of medium hardness.



Centrifugal cast bronze rims have a greater density and a higher hardness, giving increased resistance to wear and fatigue pitting. They are centrifugally cast integral with cast iron centers on 6" and smaller sizes. This permits strong mechanical keying of the two parts — without dependence on actual surface bond. Gear shaft extension diameters are especially large to permit greatly increased overhung load capacity.



Worm and gear shaft bearings are Timken taper roller type, providing adequate thrust and radial capacity. Worm bearings are mounted directly in the housing bore for greater rigidity.

STEEL
Servicenter

Please direct all correspondence to attention of Ed Service, STEEL, 1213 W. Third St., Cleveland 13, Ohio.

December 28, 1959

1960 Will be Banner Year . . .

. . . And next week you'll see banners parading throughout the pages of STEEL's 1960 Metalworking Yearbook and Planning Guide.

Here's an advance look at the contents.

"This is the year the fuse will be lighted for the biggest boom in metalworking's history," say managers when viewing the first year of the soaring sixties.

The new year will bring substantial gains over 1959 in sales, profits, employment, and capital expenditures. We found out by asking 7500 managers of metalworking plants. Barring an extension of labor problems into 1960, they foresee:

Steel output up roughly 35 to 40 per cent above the 1959 level . . . the auto industry will have its second best year in history . . . construction to continue high . . . a record year for consumer durables . . . capital equipment sales will snap out of the doldrums . . . about 10 per cent of the gross national product will go into defense spending . . . the boom will be strong all year . . . second half volume will about equal that of the first.

A tidy package, but there are knots in the bows that do it up. You, the reader, will be faced with the need for greater production efficiency and the necessity for sharper marketing in the face of mounting world competition.

STEEL's Yearbook will point up those problems, indicate approaches toward solutions, and help you prepare for the explosive growth of the sixties.

PRODUCTION EFFICIENCY

The 1959 (and 1960?) steel strike was fought over efficiency. The conflict dramatized difficulties managers have controlling labor costs. Where can expenses be checked? The editors place two big check marks next to improving the efficiency of production equipment and material management. Those two topics are the seeds for STEEL's new Program for Management series.

For example, new or modified techniques such as value analysis and operations research have made a near-science of material management—yet many managers wear a sheen on their trousers because they prefer a seat-of-the-pants approach.

Another example: There is an estimated $40 billion worth of obsolete machinery in U. S. plants. Yet many believe the same plants are the most modern in the world.

WHAT METALWORKING MANAGERS EXPECT

You'll find a good planning tool in our annual survey of 7500 general managers—they gave us their expectations for the coming year. In addition to those predictions already mentioned, these men see greater efficiency, more stable prices, and improved prices despite rising costs. Nearly half will expand or modernize their plants. Their prime problems: Inflation, price competition, wage pressures, inadequate depreciation allowances, and foreign competition.

1960 FORUM ON TECHNICAL PROGRESS

People are asking what new techniques the sixties will bring to metalworking. STEEL's Forum on Technical Progress is designed to give you clues to trends and answers to such questions. We called on 278 authorities to tell you what's developing or likely to come in machines, processes, and materials. Their comments are grouped into 15 categories.

Facts and Figures for '59

The twelfth annual edition of Metalworking Facts and Figures is in the Yearbook, and it will give you a lift in analyzing markets and checking on trends in prices, earnings, labor, and production.

It contains 344 statistical tables and graphs which were provided by some 60 sources, not counting our own research. Its 48 pages com-

I believe _____ automobiles will be produced in the U. S. from Jan. 1 through June 30, 1960.

Mail this to:
Beat-the-Experts
STEEL
Penton Bldg.
Cleveland 13, Ohio

PRINT NAME _____
POSITION _____
COMPANY _____
ADDRESS _____
CITY _____
STATE _____

ACME'S CONVEYOR ATTACHMENTS

INCREASE PRODUCTION and LOWER COST

These are just a few of many conveyor attachments designed by ACME Engineers. They were made for greater speed and durability on automatic machinery . . . they give smoother running performance . . . greater speed and higher production. ACME chains are available in a complete range of sizes from ¼" pitch to 2½" pitch. Investigate the many advantages that ACME Conveyor Chains and Attachments offer you.

Call your local Industrial Distributor. He has the full cooperation of our Engineering Department.

Write Dept 10-M for new 100-page Illustrated Catalog, including new engineering section showing diagrams of 36 methods of chain driving.

Acme Chain Corporation
HOLYOKE MASSACHUSETTS

prise the most complete package of metalworking statistics available.

Hopscotching the Departments

Our editors picked up the long glass for a look into 1960's prospects. In Metalworking Outlook, you'll read reports on what's ahead in all segments of metalworking . . . In The Editor's Views, you'll see comments on the problems of 1960 and the decisions to be made . . . Windows of Washington will open up to four pages on foreign trade and competition, defense spending, views on Taft-Hartley, inflation, and the national budget . . . In Mirrors of Motordom you'll discover the spotlight is on economy—carmakers feel the consumer wants it, so economy will be emphasized in car designs, manufacturing, and marketing . . . The 1960 Calendar of Meetings will give busy executives a chance to schedule attendance at important meetings and expositions . . . Major events which affected metalworking will be recorded chronologically for reference in Highlights of 1959 . . . The Market Outlook will deal with prospects for steel supply and demand in 1960 . . . Under Nonferrous Metals you'll find out how aluminum, copper, and other metals will play increasing roles.

Still Time To Enter

If you're reading this column before midnight, Dec. 31, there's still time to enter STEEL's Beat-the-Experts contest. All you do is complete the handy coupon on Page 5 and mail it in.

That simple act could put you in line to win two weeks behind the wheel of any car made by Ford Div. of Ford Motor Co.

Five runners-up will win full color prints (11 by 14 in.) of the dream car you see above. It was created by Virgil M. Exner, vice president and director of styling, Chrysler Corp. Contest results will be announced in July, 1960.

Among Our New Year's Resolutions...

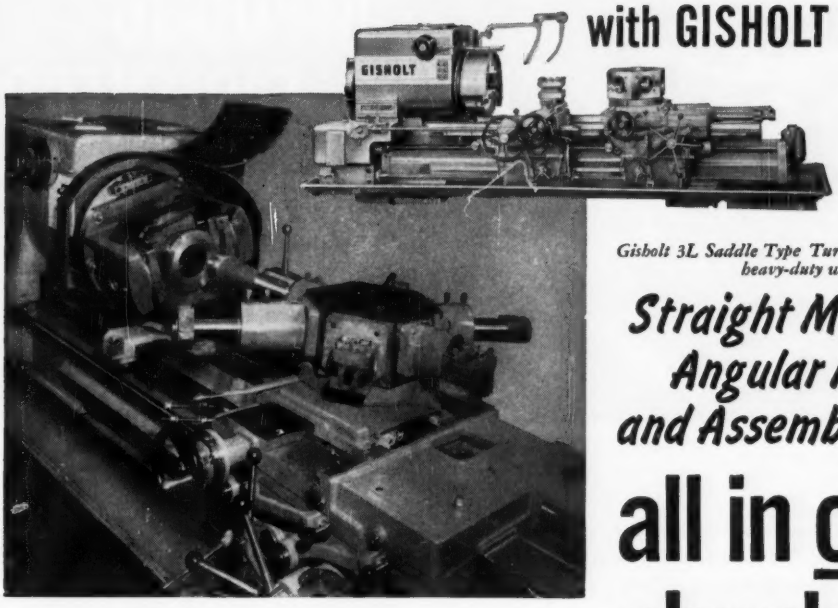
. . . We're including one to give you articles on the date they are scheduled to appear. Last minute developments caused the editors to move Associate Managing Editor John Morgan's article "How to Develop Creative Talent" from the Dec. 21 issue to this one. You'll find his article somewhere east of this department.

Happy New Year—from Ed Service and all the editors.

Nice work if you can do it...

and you can...

with GISHOLT Turret Lathes...



Gisholt 3L Saddle Type Turret Lathe—one of five sizes for heavy-duty work of all kinds

Straight Machining... Angular Machining and Assembly...

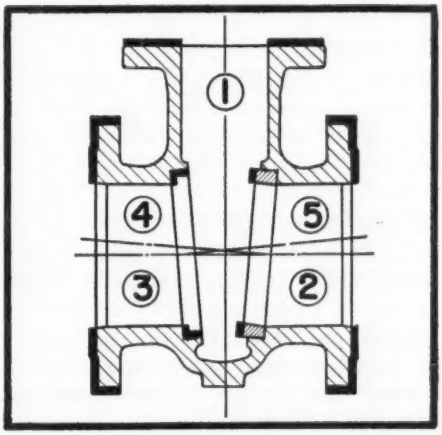
all in one chucking!

Talk about time-cutting ideas, here's the versatility of a Gisholt 3L Saddle Type Turret Lathe paying off again.

All operations required to machine these gate valve bodies are done in a single chucking with a five-position indexing fixture. In addition to machining the bonnet and the two ends, the recesses for the two seat rings are bored and threaded at a five degree angle.

Then the seat rings are inserted—and tightly screwed in place with a driver mounted on the turret. The driving is done with a constant torque—adjustable to suit each job. The final operation is finish facing the seat ring after it is in place with the cross-feeding turret.

Gisholt Engineers have storehouses of ideas to help you increase your production. Ask one to call.



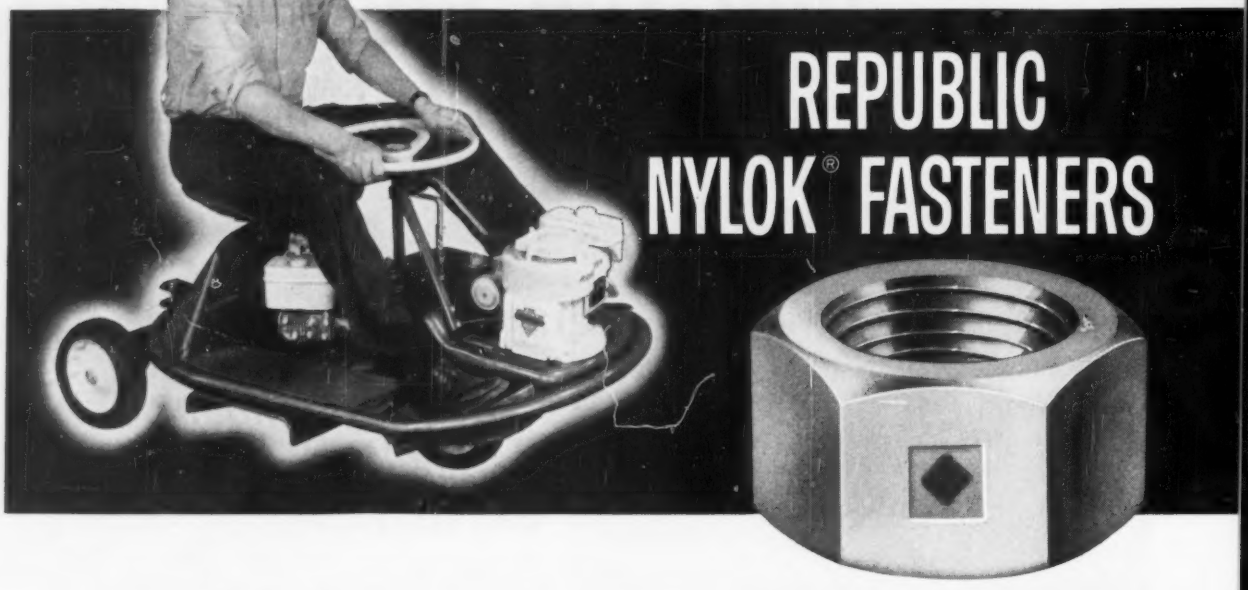
GISHOLT MACHINE COMPANY

Madison 10, Wisconsin, U.S.A.

MASTERLINE GISHOLT SINCE 1887 GISHOLT

ASK YOUR GISHOLT REPRESENTATIVE ABOUT GISHOLT FACTORY-REBUILT MACHINES WITH NEW MACHINE GUARANTEE

Where secure holding power is needed most...



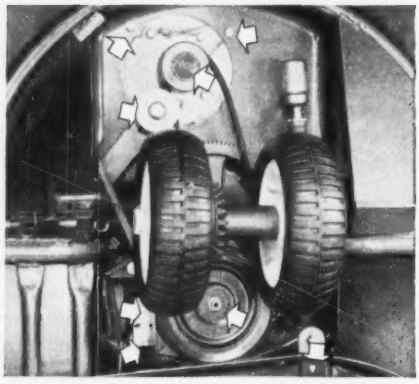
Users from coast to coast know about the quality construction of Roberton Twin Power Riding Mowers, made by Roberton Manufacturing Company, Chicago, Illinois.

Efficient riding mowers like these, constantly used to cut grasses of varying thickness and height, are subject to intense vibration. Yet their *two* power units are firmly held in place for long, dependable service by a total of 44 Republic Nylok Fasteners.

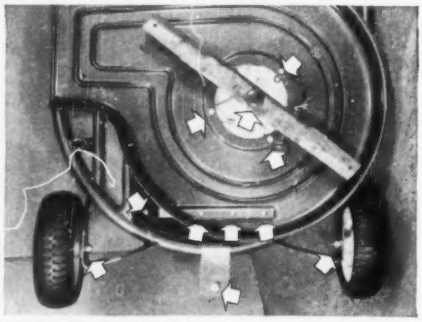
Republic Nylok Fasteners have a special nylon insert that assures positive locking at any position, even under severe shock, vibration, or tension. When the fastener is assembled, this nylon plug exerts pressure in a lateral direction, preventing all play, and utilizing the metal-to-metal contact of the opposing threads for locking.

Republic Nylok Fasteners provide maximum holding power under all conditions, whether seated or not; and they can be used repeatedly. One of their unique advantages is the "plastic memory" of the nylon plug—the tendency of the nylon to recover its original shape after assembly. This "growth" into the threads actually results in a tighter locking action, after a period of time, than when the fastener was first assembled.

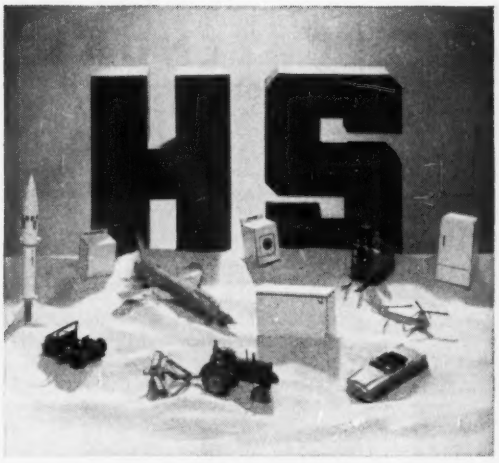
The nylon insert is unaffected by age or cold, has high resistance to heat, and very low moisture-absorption rate. These are but a few of the reasons why Roberton Manufacturing Company uses Republic Nylok Fasteners in its advanced line of power mowers. Advantages like these can pay dividends in *your* application, too. For full information, contact your Republic representative, or mail coupon.



DRIVE UNIT, which furnishes motive power for Roberton Mower is securely held in place by Republic Nylok Fasteners as indicated by arrows. Engine remains tight against base even after years of hard service.



POWER FOR CUTTING is provided by a second, independent engine. Imagine the vibration set up by the swift-moving blade shown. Yet Republic Nylok Fasteners hold engine, wheels, and other parts, firmly in place.



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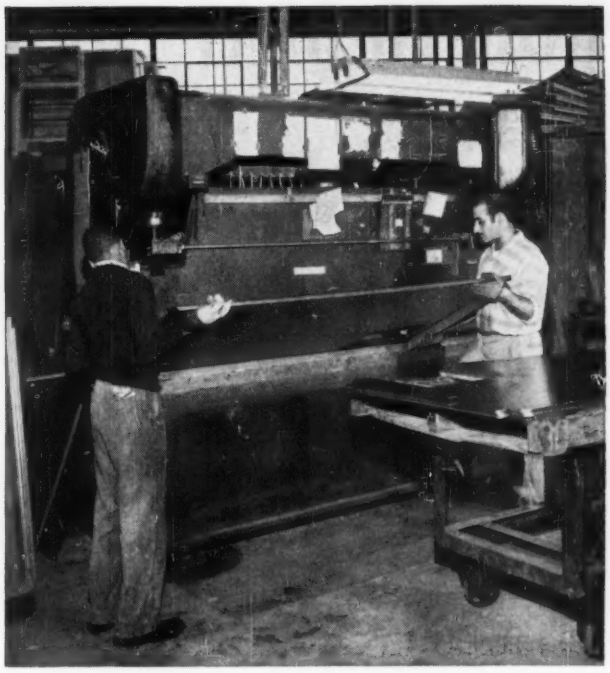

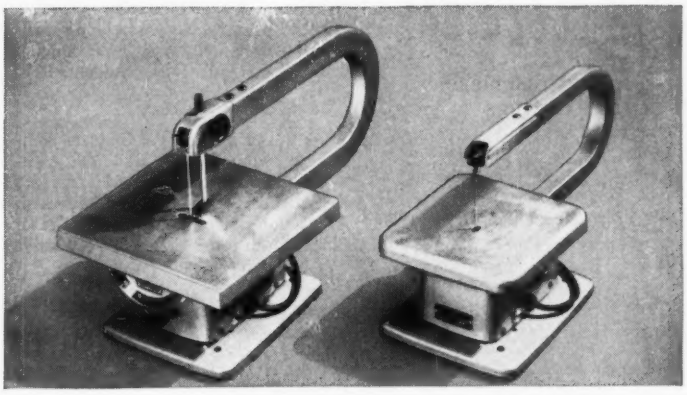

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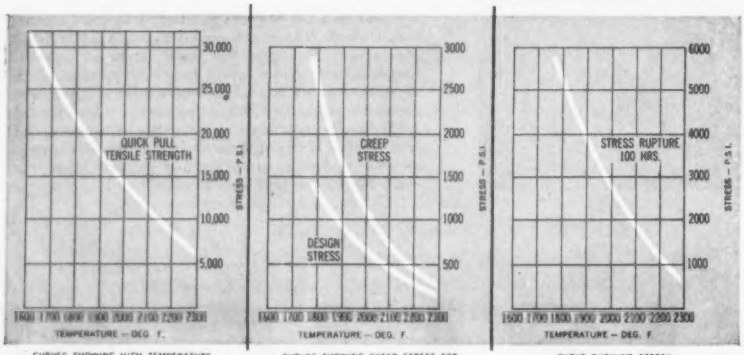

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CALENDAR OF MEETINGS

Jan. 6-8, American Management Association: Special packaging conference, Roosevelt Hotel, New York. Association's address: 1515 Broadway, New York 36, N. Y.

Jan. 10-13, Institute of Scrap Iron & Steel Inc.: Annual meeting and exhibit, Fontainebleau Hotel, Miami Beach, Fla. Institute's address: 1729 H St. N.W., Washington 6, D. C. Executive vice president: Edwin C. Barringer.

Jan. 11-15, Society of Automotive Engineers Inc.: Annual meeting and engineering display, Sheraton-Cadillac and Statler-Hilton Hotels, Detroit. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: John A. C. Warner.

Jan. 15, Malleable Founders' Society: Semi-annual meeting, Sheraton-Cleveland Hotel, Cleveland. Society's address: 781 Union Commerce Bldg., Cleveland 14, Ohio.

Jan. 18-19, Industrial Heating Equipment Association: Annual meeting, Warwick Hotel, Philadelphia. Association's address: Associations Bldg., Washington 6, D. C. Executive vice president: Robert E. Fleming.

Jan. 18-21, American Road Builders Association: Annual convention and highway materials and services exhibit, Netherland-Hilton Hotel, Cincinnati. Association's address: 600 World Center Bldg., Washington 6, D. C. Executive vice president: L. W. Prentiss.

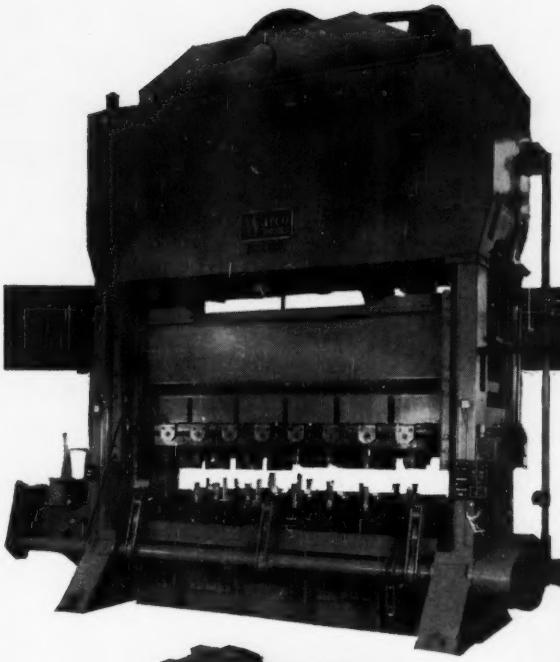
Jan. 19-20, Steel Shipping Containers Institute Inc.: Winter meeting, St. Regis Hotel, New York. Institute's address: 600 Fifth Ave., New York 20, N. Y. Secretary: L. B. Miller.

Jan. 20-22, American Management Association: Research and development conference, Roosevelt Hotel, New York. Association's address: 1515 Broadway, New York 36, N. Y.

Jan. 20-22, Steel Plate Fabricators Association: Annual meeting, Roosevelt Hotel, New Orleans. Association's address: 105 W. Madison St., Chicago 2, Ill. Secretary: J. Dwight Evans.

Jan. 21-22, National Industrial Conference Board Inc.: General session for all associates, Hotel Commodore, New York. Board's address: 460 Park Ave., New York 22, N. Y.

Jan. 24-27, Truck-Trailer Manufacturers Association: Annual convention, Del Coronado Hotel, Coronado, Calif. Association's address: 710 Albee Bldg., Washington 5, D. C. Managing director: John B. Hulse.



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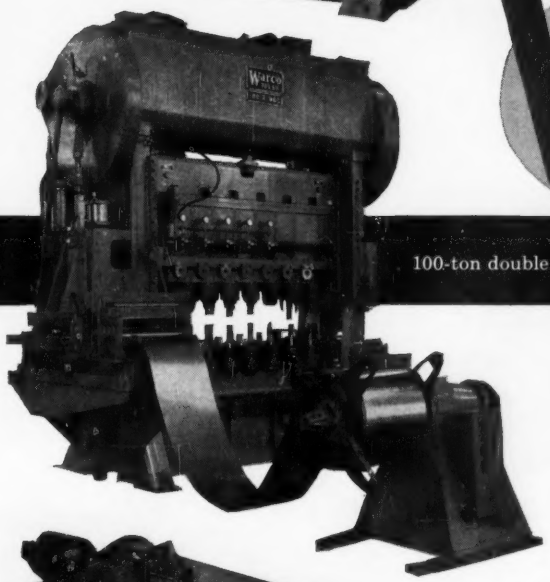

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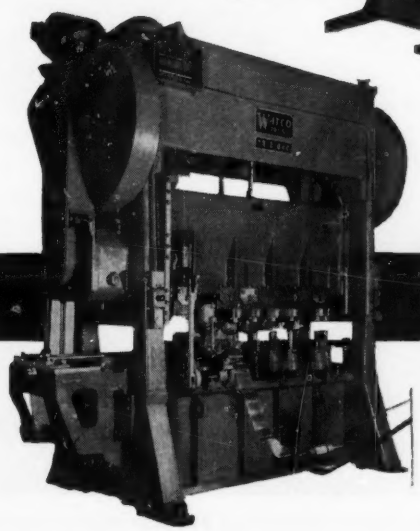

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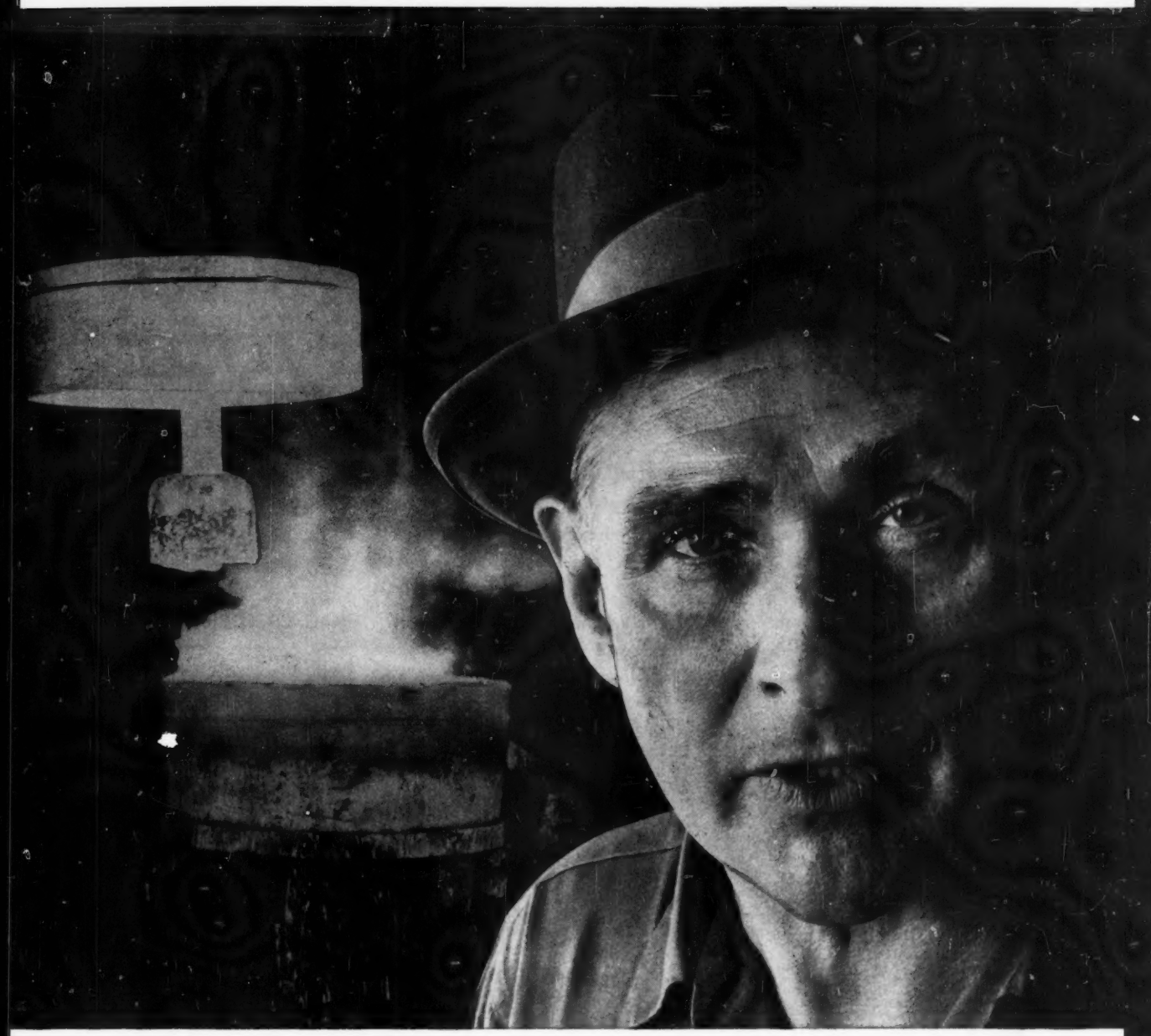

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How's your

Here's how you can *test yourself* on your skill as a steel buyer. Just answer the following questions after reading the instructions carefully. The correct answers are on the next page. (Don't peek!)

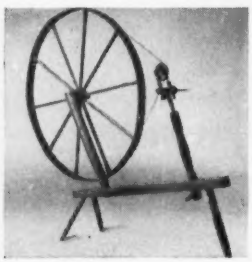
1. One of the types of equipment shown in these four pictures is not ordinarily available at steel service centers. Which is it?

a

b

c

d



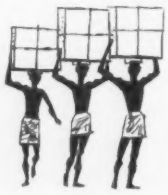
2. Service centers usually stock these types of steel (Circle the correct answers—and watch it, this one's tricky!):

a Plates **b** Saucers **c** Carbon Bars **d** Alloy Bars
e Sheets **f** Pillow Cases **g** Steel Wool
h Structural Shapes **i** Reinforcing Bars
j Foundation Garments **k** Tool Steel

3. You get fast steel deliveries from service centers because they ship direct to you by . . . (Select one):

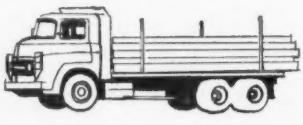
a

b



c

d



steel BUY-Q.?

4. This one tests your powers of logical reasoning:

A steel service center is to the average steel user as . . . (Select one):

a Soup is to nuts **b** Chester is to Marshal Dillon **c** His right arm is to Ingemar Johannson

Now check your answers—and good luck!

ANSWERS:

(1) You should have checked (d). Not that service centers wouldn't have a couple spinning wheels around if they'd be of service to you—it's just that there hasn't been much demand lately. Credit: 15 points.

(2) You should have omitted (b), (f), (g), and (j), and we won't budge an inch. Credit: 40 points. Subtract 5 for every item you got wrong.

(3) If you picked (d) again you're right on the beam. Most of our readers prefer truck deliveries, all things considered. Credit: 20 points.

(4) If you picked (b), you're right. BUT, if you picked both (b) and (c), we'll give you *double* credit. Score: 15 points, or 30 if you were really alert!

Now total your score.

90 and up—Congratulations! You're a top-flight purchasing agent and have probably been buying Bethlehem products from steel service centers for *years*.

80-89—Good show, but there's room for improvement. Don't let your inventories get too big when you should be relying on a service center.

70-79—Better brush up on steel service centers. Use them properly and you'll save your firm lots of money (and *you* may be on your way to Fame and Fortune).

Below 70—You better come by the office and have a long talk with us.

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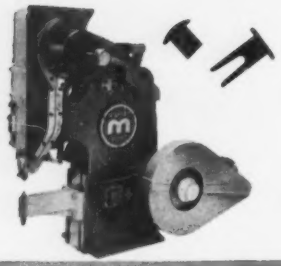

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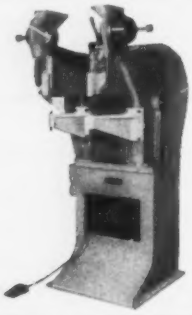

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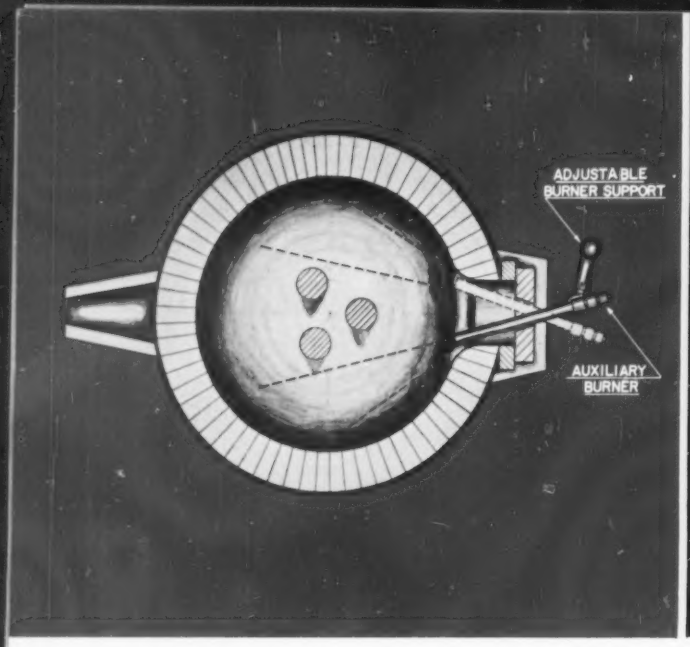
Vol. 6 No. 3
December 1959

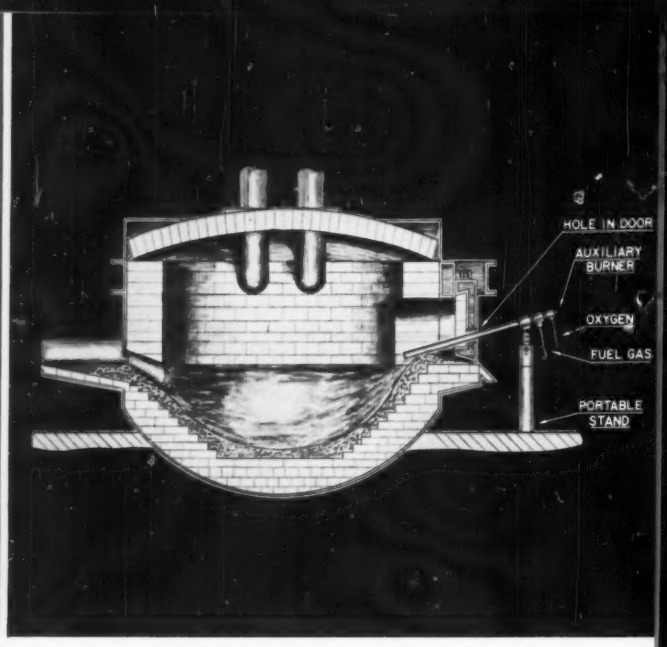
NATIONAL CARBON COMPANY'S

CARBON AND GRAPHITE NEWS

A NEW CONCEPT FOR USING OXYGEN IN ELECTRIC FURNACES

By G. W. Hinds





Figs. 3 & 4. Top and side views of a typical door burner installation designed by LINDE for electric arc furnaces having a capacity under ten tons.

A NEW CONCEPT FOR USING OXYGEN IN ELECTRIC FURNACES

G. W. Hinds

Development Engineer, Development Laboratory

Linde Company, Division of Union Carbide Corporation

Introduction

Today, more than ever before, there are many new techniques constantly under investigation to help the electric furnace industry continue to improve its competitive position. How to increase production and lower costs has been under intensive study throughout the industry. In this respect, a few electric furnace shops have experimented with air-gas burners fired through the door, roof, and into scrap buckets to pre-heat scrap both before and after charging to utilize lower cost heat and to increase production.

Recently, a practical process has been developed by Linde Company for using oxygen to assist scrap meltdown in electric-arc furnaces. This process utilizes newly-designed oxygen-fuel gas "door" or "wall" burners to speed this operation.

Based on production tests, the use of this equipment has resulted in these major advantages:

1. PRODUCTION HAS INCREASED FROM 15 TO 20 PER CENT.
2. POWER CONSUMPTION HAS DECREASED 15 TO 20 PER CENT.
3. THE USE OF OXYGEN HAS RESULTED IN UNIFORM SCRAP MELTING RATES.
4. ELECTRODE CONSUMPTION REMAINS NORMAL WITH THIS PROCESS.

Oxygen-Gas Burner for Rapid Scrap Meltdown

In early development, it was known that oxygen should reduce scrap meltdown time. On this basis, tests were conducted wherein oxygen and gas pipes were positioned at all angles to each other from parallel to perpendicular for post mixing. A concentric burner design shown in Figure (1) was found to perform best. With this type of

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burner, oxygen flows through the center pipe while natural gas flows through the surrounding annular pipe. This equipment became the basis of present burners known as "door burners" and "wall burners."

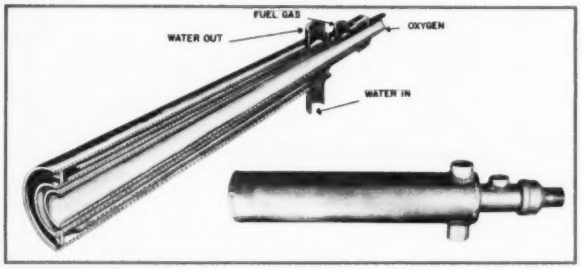


Fig. 1. Linde Company concentric burner design which is basis for door and wall burners.

Door Burners

A typical door burner is shown in Figure (2). Although the burner as shown is not water-cooled, a water-cooled jacket may be provided.

Installation of this burner is relatively simple. It is only necessary to support the burner through a hole in the door so that the burner can be directed as required at scrap between the electrode and furnace wall as shown in Figures (3) and (4) on opposite page. In initial tests, the burner can be supported through a partially opened door.

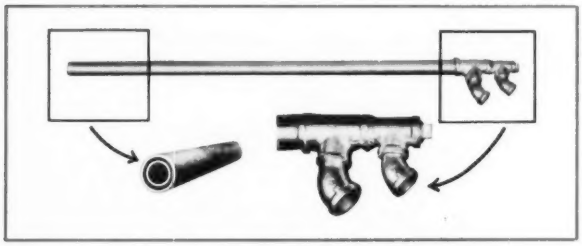


Fig. 2. A typical door burner designed by LINDE.

Wall Burners

A typical water-cooled wall burner of LINDE's design is illustrated in Figures (5) and (6) shown below. Generally, three or more burners of this type can be installed on furnaces ranging in capacity to 200 tons or more.

A primary consideration for the successful use of wall burners is that their installation should be practical and should not be complicated. Combination wall port and water-cooled burners have been found to give satisfactory maintenance-free operation. *A special feature of their design is that separate port coolers are not required.* The non-cooled oxygen pipe can be quickly removed for tip cleaning if necessary. The burners are positioned tangentially in the wall and directed downward at an angle of approximately 15° from the horizontal. This is to allow direct scrap contact for as long a period as possible.

Controls

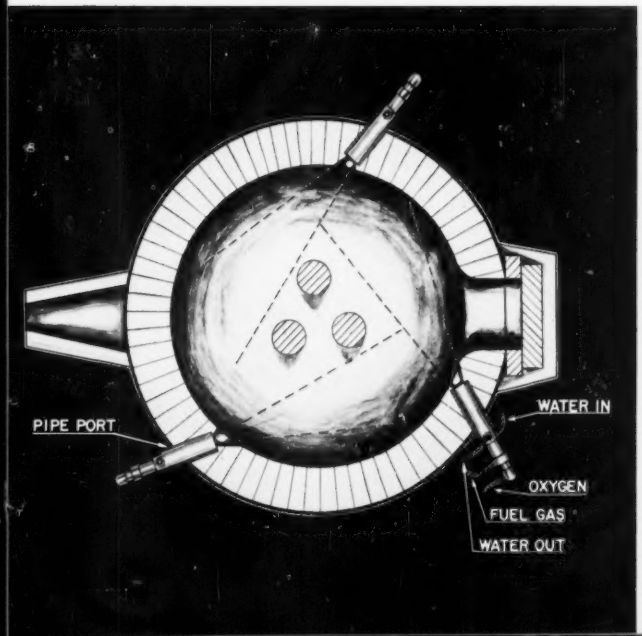
To supply fluids to the burners, it is necessary to install water, oxygen and natural gas manifolds around the furnace shell. A water pressure of 20 to 30 p.s.i. is maintained at the burners.

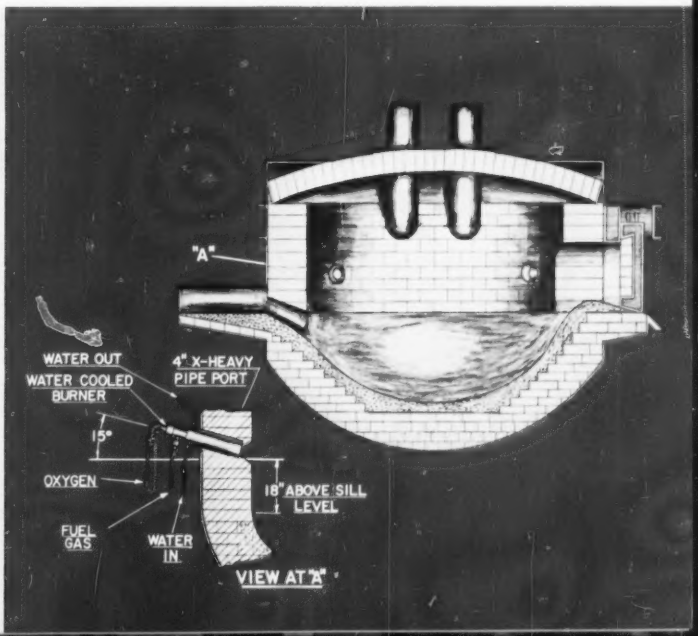
Every auxiliary burner furnace installation should include a control panel near the furnace as shown schematically in Figure (7). Automatic safety valves shut off the flow of both oxygen and fuel gas in the event that abnormally wide pressure variations occur.

Operation

Auxiliary burners for scrap meltdown are turned on after the furnace has been charged. They are then operated continuously for as long as they can be effective on scrap remaining in the furnace. The precise moment for turning on the burners varies with charging practice. In door charging practice, it is as soon as there is sufficient scrap in the furnace. In top charging, the burners are turned on either slightly before or immediately after dropping the charge into the furnace.

Figs. 5 & 6. Top and side views of a typical wall burner installation designed by LINDE for electric arc furnaces having a capacity of ten tons and over.





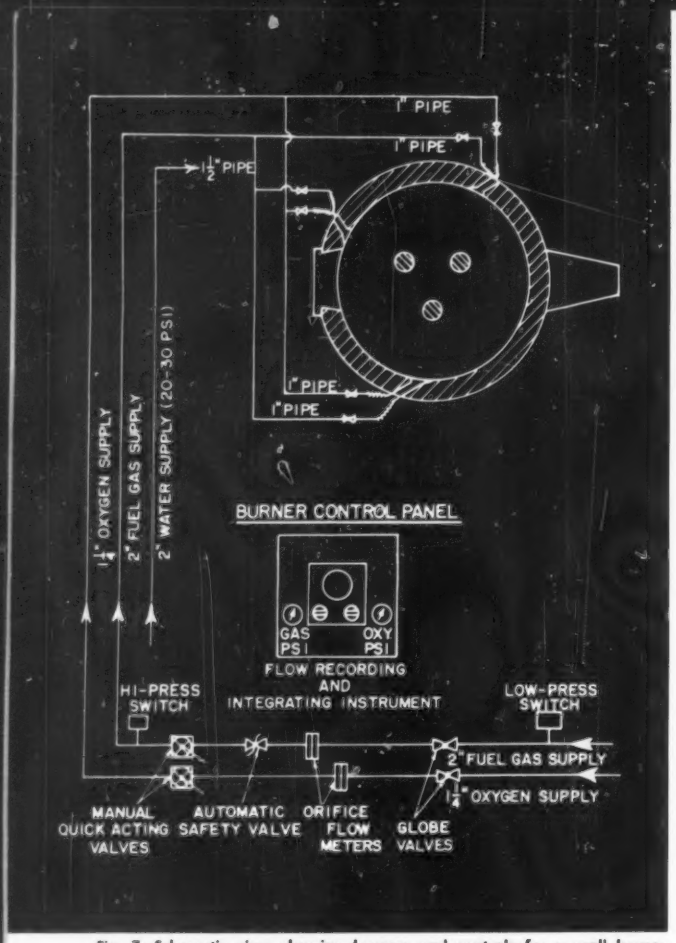


Fig. 7. Schematic view showing burners and controls for a wall burner electric furnace installation by LINDE.

Flow rates are established in accordance with data in Table (1) by appropriate adjustments at the control panel. When starting on a new charge in wall burner practice, the flame should be adjusted to a minimum for a few minutes to allow time for the burner flames to cut into the scrap directly in front of the burner ports. This will prevent flame deflection against the wall.

Numerous tests on all size furnaces indicate normal refractory and electrode consumption. With water-cooled wall burners, the brick lining around the burners remains intact with very little wear.

Test Results

Principal effects of the auxiliary meltdown oxygen-gas burners are faster meltdown time and lower power consumption. Several important effects other than these are:

1. Scrap is melted uniformly away from the walls and banks early, thereby reducing the possibility of broken electrodes due to scrap cave-ins. Furnaces with low capacity transformers have difficulty melting scrap around the edges of the bath. The scrap hangs in ledges around the walls and frequently falls into the bath late in the heat, causing unexpected analysis changes.
2. Burners can be directed toward furnace "cold spots" to accomplish uniform meltdown and to eliminate scrap hangers.
3. Burners can be operated during each back charge. Burner operation during periods of "power-off" is considered exceptionally worthwhile since the flame continues to heat and melt the scrap.
4. Burners can be operated on the cold charge in newly relined furnaces prior to arrival of furnace crew.
5. Light, voluminous scrap melts rapidly rather than hanging up in a mass.
6. Furnace overtime can be reduced.

Effect on Production

Tests on various size furnaces have shown unusually consistent differences between heats made with burners and heats made without burners. Figure (8) illustrates typical differences in meltdown power and meltdown time when oxygen-natural gas burners are used during the melting period of every other heat. In initial test work, the burners were operated at the oxygen-natural gas ratio of 2 to 1. This was found to result in an excessively high FeO value in the slag and low carbon values at meltdown. Near normal "melt-in" analyses were obtained by using the reducing ratio of 1½ to 1.

Evaluation tests in a 50-ton door charge furnace having two back charges produced the following results when two burners were fired through the side door at flow rates of 10,000 cfh oxygen and 7,000 cfh natural gas each. Meltdown time was reduced 15 per cent and meltdown power decreased 19 per cent. No differences were noted in bath temperature at "melt" or in furnace yield.

Table I — Representative Oxygen and Fuel Gas Flows for Scrap Meltdown in Electric Furnaces

Type Burner	Furnace Size tons	Number of Burners	Flow Rate/Burner		Total Flow Rate	
			Oxygen cfh	Gas cfh	Oxygen cu. ft. per hour	Gas cu. ft. per hour
Door	1	1	3,000	2,000	3,000	2,000
	2	1	5,000	3,300	5,000	3,300
	4	1	6,000	4,000	6,000	4,000
	8	1	7,500	5,000	7,500	5,000
Wall	10	3	3,000	2,000	9,000	6,000
	20	3	6,000	4,000	18,000	12,000
	50	3	7,500	5,000	23,000	15,000
	80	3	11,000	7,500	33,000	23,000
	100	4	9,000	6,000	36,000	24,000
	200	4	10,000	6,700	40,000	27,000

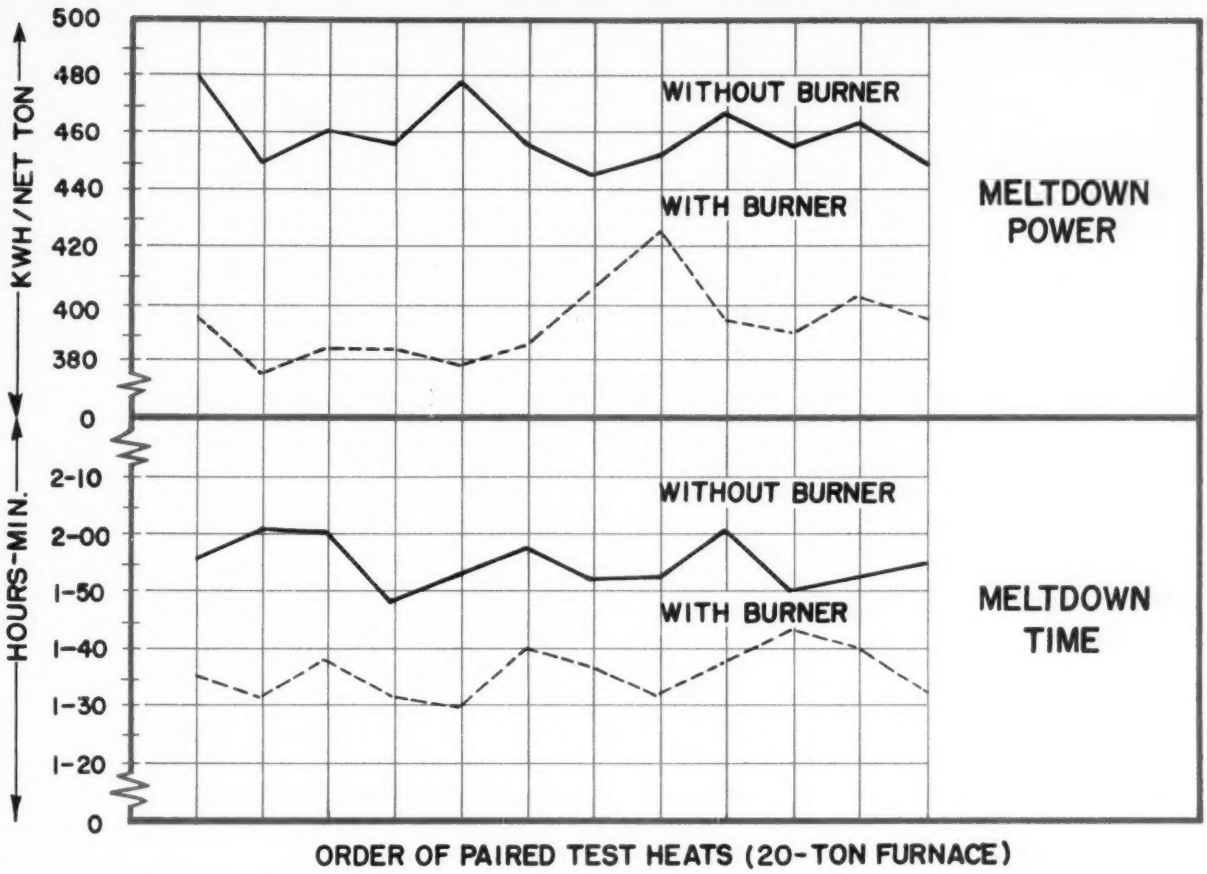


Fig. 8. Typical differences in meltdown power and meltdown time when "Linde" oxygen-natural gas burners are used during every other heat.

Single burner operation with 11,400 cfh oxygen and 7,600 cfh gas in a 20-ton top charge furnace reduced the average meltdown time 15 per cent. The fact that meltdown power was only reduced by 14 per cent is attributed to the type of scrap used. Three back charges were required.

Similar results were obtained when operating a 4-ton, top charged furnace for making low carbon steel castings and using a door fired burner for 30 minutes. The average total power was reduced approximately 15 per cent. The tap-to-tap time was reduced by 15 per cent, while the production increased by 14 to 20 lbs. per minute.

Exceptional savings have been experienced in a shop having only one 1500 KVA transformer for two 4-ton furnaces. A single oxygen-gas burner was operated through the door of one fully charged furnace, while meltdown proceeded normally in the second furnace. *On both stainless and ordinary carbon steel, power requirements were reduced by 30 per cent and heat time was reduced from 30 to 50 per cent.* Because of limited transformer capacity, the burner was operated for approximately 1½ hours before power was made available. However, for normal operation, oxygen-gas burners and power should be used simultaneously.

Conclusion

The use of oxygen-fuel gas burners for scrap meltdown in electric furnaces results in increased production accompanied by power savings with normal electrode consumption. In most shops, the operation of auxiliary scrap meltdown burners is of primary importance under one or more of the following circumstances:

1. When finishing capacity exceeds furnace capacity.
2. When the need exists for increased production.
3. When power supply is subject to interruption.
4. Where there is excessive furnace overtime.

Oxygen-fuel gas burners for scrap meltdown promise to fill a long standing need on the part of electric furnace operators. The lower power consumption and increased production associated with these burners can play an important role in improving the competitive position of older shops. When included in the design of new furnace installations, these burners can reduce capital expenditures while increasing production capacity.

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Other Uses of Oxygen in Electric Furnaces

The previously mentioned application of oxygen-fuel gas burners will undoubtedly prove to be of practical value to the electric furnace industry. Although this application is new, oxygen itself has been employed as a tool in electric furnace practice since the Second World War. It has been used widely throughout the industry—in all sizes of furnaces from one to over two hundred tons—for refining carbon, alloy and stainless steels. In each of these operations, the use of oxygen provides increased production accompanied by substantially reduced power consumption.

In addition to the above mentioned applications, the industry has given close scrutiny to the use of oxygen for desiliconizing hot metal.

The following is a brief discussion covering the use of oxygen for these practices.

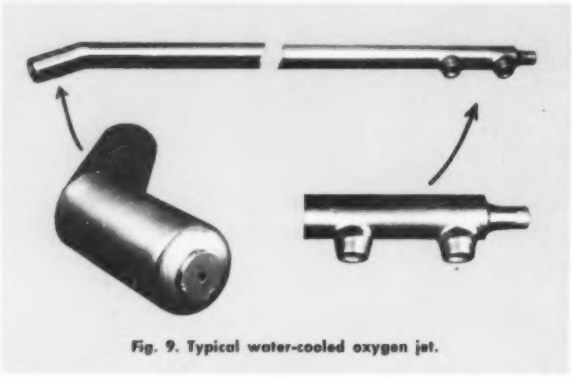

Fig. 9. Typical water-cooled oxygen jet.

Oxygen in Carbon and Alloy Steels

Oxygen has been introduced into the electric furnace bath, both by means of a water-cooled jet or a consumable lance pipe. *With the jet,* shown in Figure (9), oxygen is supplied at varying flow rates up to more than 100,000 cu. ft. per hour. These high rates are double or triple those normally used in the past. The equipment is adaptable to furnaces of all sizes. It consists of three concentric tubes.

The internal tube is used to conduct the oxygen to a copper head containing a single nozzle designed to give the required oxygen flow at a constant pressure. The head is angled to give a vertical or near vertical oxygen stream to the bath. The remaining tubes are employed to conduct the cooling water to and away from the head.

Consumable lance pipes, shown in Figure (10), have a life of 1-3 feet per minute, the higher consumption being experienced during the lancing of stainless steel melts. The internal diameter of the lance should be selected according to the pressure and flow of oxygen. Lance life can be extended 50% or more by coating with refractories.

Table 2 shows the typical lance sizes employed for various flow rates at line pressures between 125 p.s.i. and 150 p.s.i. The pressure measured at the head of the lance may be some 25 per cent lower.

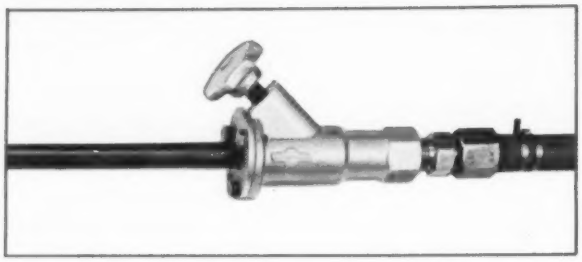

Fig. 10. Typical oxygen consumable lance pipe and holder.

FLOW RATE	*LANCE SIZE*
Cu. ft./min.	*in.*
up to 250	⅜″
250-300	½″
300-450	¾″
450-600	1″

Table 2. Typical lance sizes employed for various flow rates at line pressures between 125 p.s.i. and 150 p.s.i.

Higher working pressure will obviously increase the rate of flow, but the available pressure is often restricted by the supply pressure and the distance from oxygen storage. It is customary to introduce the lance through the charging door at an angle of approximately 25° to the bath surface and to hold the tip at a depth of four to six inches below the slag-metal interface. With a little practice, the operator becomes familiar with the sound and feel of the lance and can judge when the correct immersion position has been obtained and when the lance requires feeding farther into the bath.

Requirements for Carbon Removal

The rate at which carbon can be removed from a bath of molten steel in an electric furnace depends on a number of factors. They are: initial carbon content, range in which carbon is removed, concentration of FeO in the slag, metal temperature, rate and time of oxygen input, presence of other elements, bath weight, and slag-metal contact area. Other factors peculiar to a particular furnace may also influence the rate of carbon elimination. However, one or more particular factors may have an overriding influence in different operations.

Oxygen lancing and jetting have proved capable of reducing carbon at a rate much greater than the ore boil, with no deleterious effect on furnace refractories, and in general, an improvement in steel quality. The greater carbon removal rate is accompanied by a higher temperature increment and hence a reduction in power consumption.

Oxygen in Stainless Steels

Before the introduction of the oxygen lance and jet, stainless steels were made either by melting a charge of mild steel scrap, decarbonizing with ore and adding the alloying elements in the form of very low carbon ferro-alloys, or by melting a mixture of stainless steel scrap and mild steel scrap and removing the carbon, together with a large proportion of the chromium, by means of ore. A third method was to melt mild steel scrap, remove the carbon to a low limit, add a similar weight of stainless steel scrap

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and bring the charge to the required composition with low carbon ferro-chrome.

Perhaps the most important development in the use of gaseous oxygen in electric furnace practice is the introduction of oxygen lancing in the manufacture of all types of stainless steels. The technique has been successfully applied to removing carbon from steel in the presence of high percentage of chromium, enabling high quality stainless steels to be produced from 100 per cent stainless steel scrap charges. Prior to the introduction of this method, most types of stainless steel scrap had little commercial value and large quantities were dumped. This meant a considerable loss of valuable nickel and chromium to the metallurgical world which could only be replaced by virgin materials. As a result, the cost of producing stainless steels, particularly those containing nickel, tungsten and molybdenum, was extremely high.

The equipment required for decarbonizing stainless steel melts is essentially the same as that used for carbon steel production, except a higher specific flow rate is required and consequently, for an identical size furnace, a larger bore lance may be employed.

Oxygen flow rates should be as high as practicable, since the carbon will be eliminated at a greater rate with a high flow rate and a lower carbon will result. Figure (11) illustrates the difference in decarbonizing at varied input rates. This is particularly important when producing low carbon stainless steels. A high flow rate often improves refractory life since the blow is completed in the minimum time. With a prolonged blow the furnace hearth is held at a high temperature for an excessive time, resulting in increased wear.

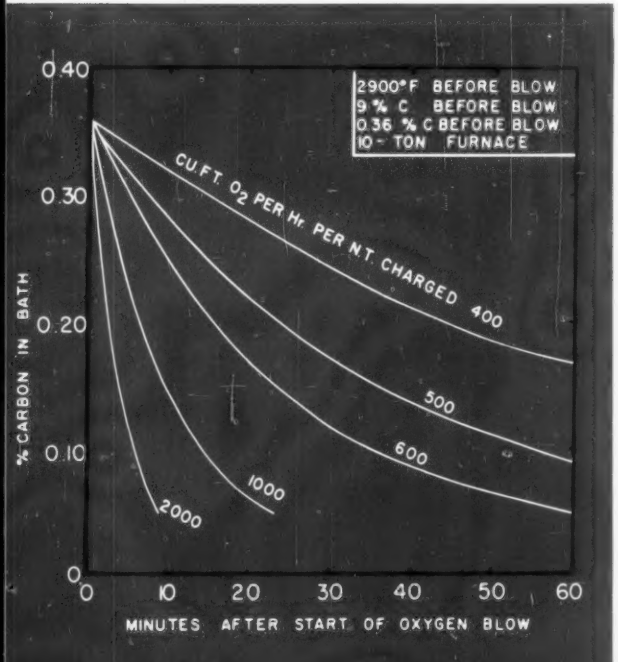

Fig. 11. Influence of oxygen input rate on progress of decarbonization.

Oxygen Desiliconization for Hot Metal in Electric Furnaces

With the continued search within the steel industry for methods of increasing production without the necessity for high capital outlay, the use of the oxygen lance or jetting probe for silicon removal from hot metal has come under close examination.

The quick removal of silicon subsequent to refining can be attractive to many operators because it increases production by reducing refining time. For example, in the electric furnace, the elimination of three-fourths of the carbon in hot metal and all of the silicon so greatly speeds melting operations that output can almost be doubled. Some furnaces in Germany are already operating with this practice, usually by blowing oxygen into the arc furnace, but good results have also been obtained in experimental heats where the desiliconizing has been accomplished prior to the charging.

Oxygen Supply and Delivery Methods

With today's increasing oxygen demand, new methods of production and distribution are constantly being sought and found. These methods not only lower the cost of oxygen, but enable it to perform in new capacities as well. The steel industry has been the recipient of the majority of these new methods. Oxygen service is actually tailored to fit the customers' needs, with the type of service determined by the volume and pattern of oxygen use.

The various methods of supply that service all steel plant activities can be broken down roughly into four categories. They are: on-site tonnage plants, "Driox" oxygen (liquid delivery and storage), "Cascade" oxygen (manifolded gas receivers), and cylinders.

On-Site Plant

This is a gaseous-oxygen producing unit which, if installed in conjunction with a liquid oxygen storage system and a dependable source of shipped-in liquid oxygen, is most economically installed as a single production unit. Otherwise, reserve or standby units are needed, full or half-size, depending on the degree of continuity of supply that is required. The plant is built on, or very near the user's property, and is usually provided, installed, operated and maintained by the oxygen supplier. The user generally provides utility services to the plant and the oxygen distribution pipelines. The on-site oxygen producing unit can be made to produce oxygen with capacities ranging from several tons per day to hundreds of tons per day. Except under very unusual circumstances, it is not economical to install an on-site plant for a requirement of less than 10 tons per day (7 million cu. ft. per month). Because it is not practical to store more than several hours output from an on-site plant, they are generally only installed where operations are conducted on a 15-21 turn per week basis.

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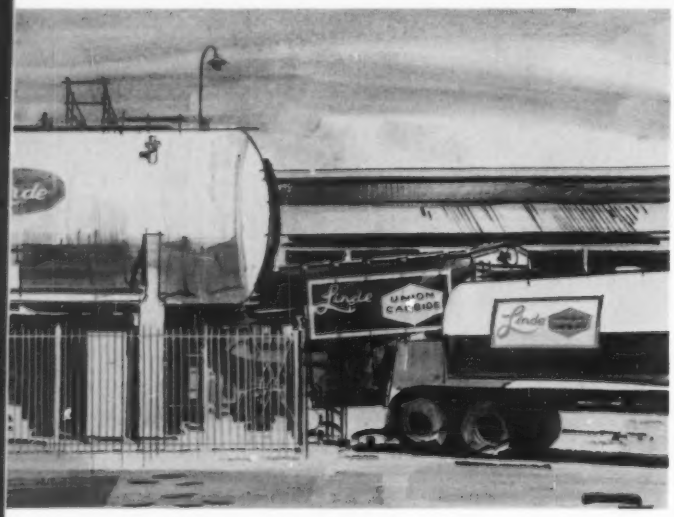
On-Site Oxygen Plant

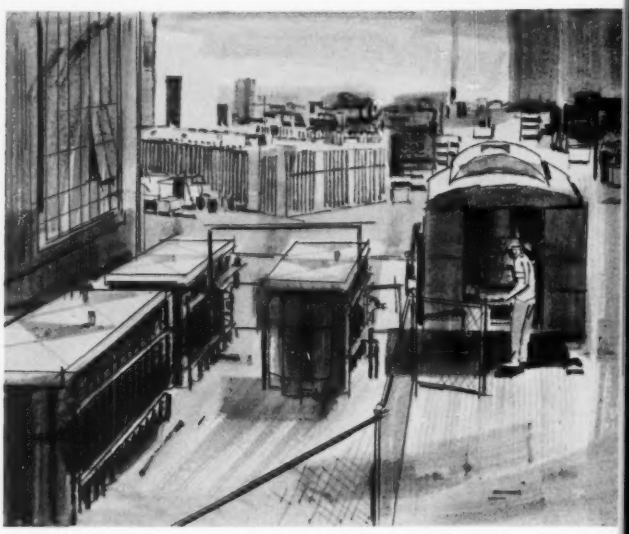
Liquid Delivery—Liquid Storage

With this method, mass-plant produced liquid oxygen is transported by truck or railroad tank car and stored as a liquid at the user's location. When it is needed, the oxygen is automatically converted to gas under pressure and carried through the user's pipelines to the various points of operation. It is ideally suited for the user whose requirements are intermittent, and can be provided for virtually any volume.



Liquid Delivery—Gas Storage

Oxygen is delivered into high pressure manifolded receivers from a liquid transport truck. The liquid oxygen is converted to gaseous oxygen by special truck-mounted converters as it is being delivered from transport truck to the manifolded receivers. This system is generally used when requirements are less than 400,000 cubic feet per month.



Cylinders

Cylinders range in size from units that hold as little as 80 cu. ft. to units containing as much as 244 cu. ft. They are portable and are used almost entirely for maintenance in the plant.

The newest development in cylinder supply is the liquid oxygen container developed by Linde Company in 1955. This cylinder is roughly the size of a 55-gallon oildrum and holds the liquid equivalent of 3,000 cubic feet of oxygen gas. Liquid oxygen is converted to gas, as needed, by equipment built into the cylinder.

All of these four methods of oxygen supply are utilized by the steel industry. As was previously mentioned, each steel plant's oxygen requirement is the key to the type of oxygen delivery or on-site unit it receives. It may be economically sound for a large, steady customer of oxygen to employ an on-site oxygen-producing unit. On the other hand, a plant with a smaller or intermittent oxygen consumption can realize the same economic advantage through delivered oxygen.

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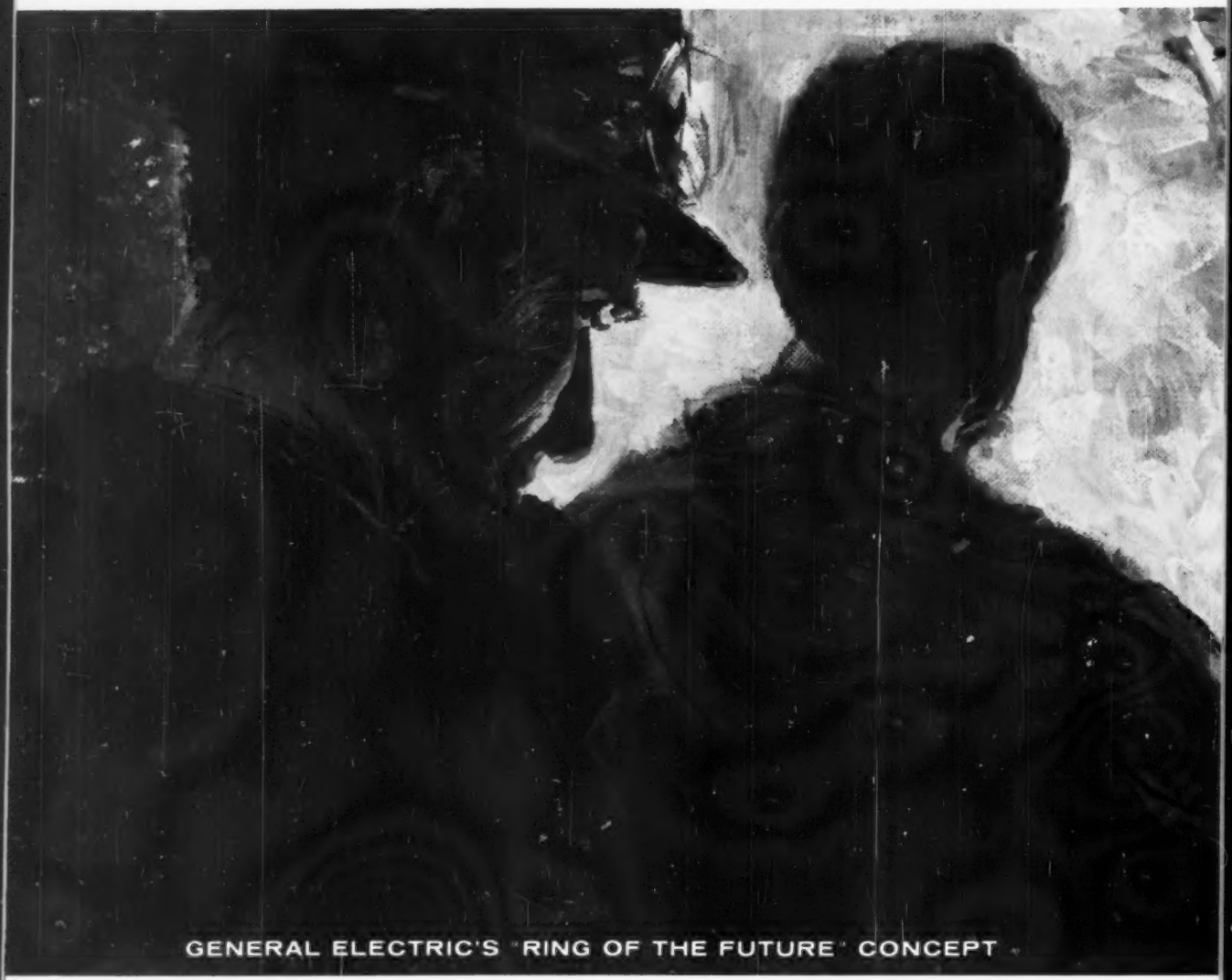

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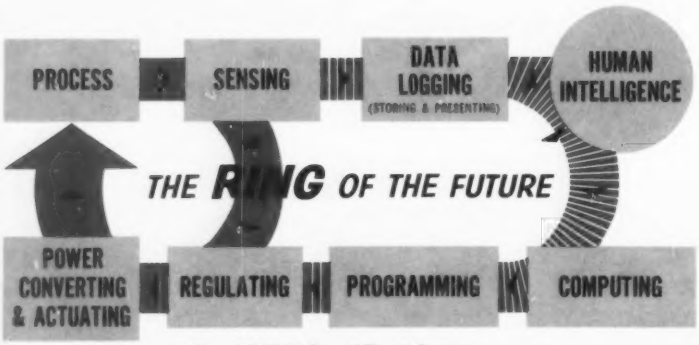

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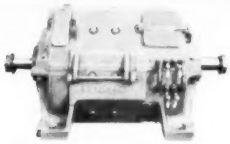

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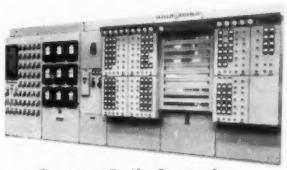

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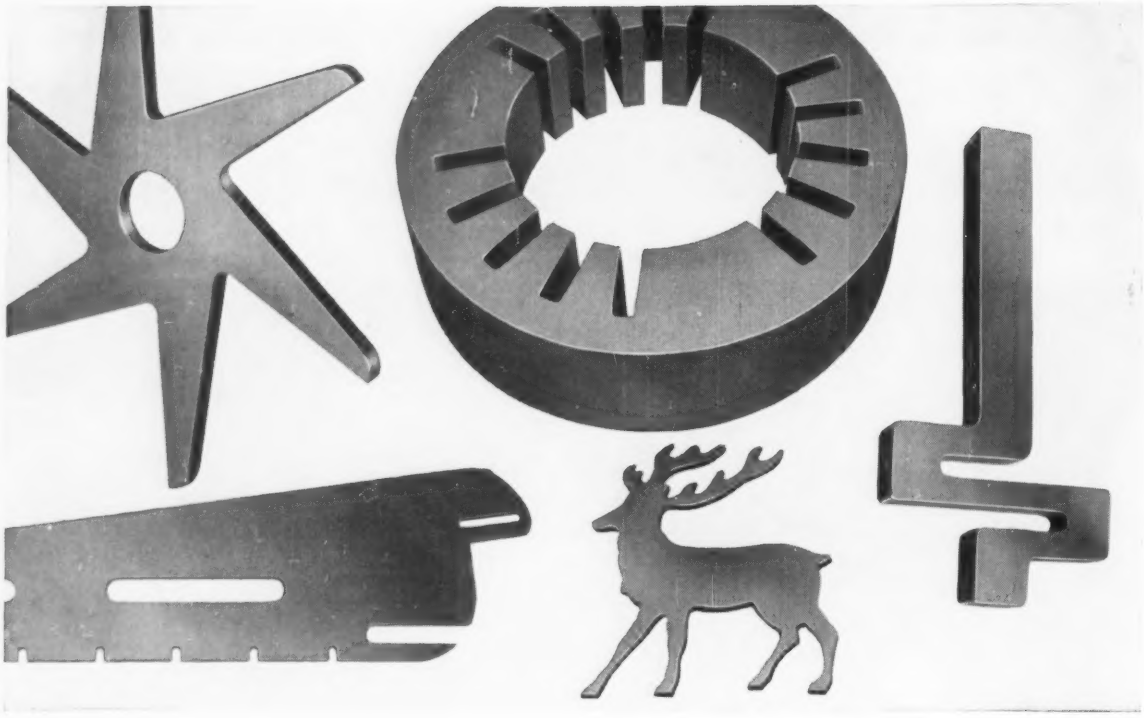

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This Panel Reconvenes Today

President Eisenhower's steel panel (l. to r., John A. Perkins, Dr. George W. Taylor, Paul N. Lehoczky) reconvenes today, as public pressure mounts for a contract settlement. Behind the scenes, both sides are being warned about the dangers of letting Congress stop a walkout (Page 37).

Investigation of Japanese Steel Dumping Starts

The Treasury Department has started an investigation of Japanese steel imports under the Antidumping Act, which forbids "entry of products into this country at less than fair value." Treasury sources report that they have been conducting preliminary surveys of the Japanese steel industry to learn their costs and prices. The formal investigation got underway Dec. 21 and will probably take several months. Products involved: Reinforcing bars, bars, plates, hot rolled sheets, galvanized sheets, angles, beams, and channels.

Are You Creative? Try This Test

Does the geometric pattern at right remind you of the moon coming over the mountain? Does it suggest other mental pictures? Using only those two forms (a circle and a triangle), how many new designs can you create? The more you can, the more creative you may be. Many authorities use the exercise as part of a test to measure creative ability. One man immediately made a chicken and a clown with the figures. Creativity is the lifeblood of industry. More and more, management is recognizing that fact. So progressive companies are seeking out and training creative people. For guideposts, see Page 53.

Total Construction in 1960 Put at $76 Billion

Watch for construction volume to reach $76 billion next year—$56 billion in new construction and $20 billion in maintenance and repair. That compares with $73 billion this year—$54 billion in new construction and $19 billion in repair and maintenance. That's the prediction of Associated General Contractors of America, which gives this outlook by categories: Residential—down 4 per cent to $21.4 billion; commercial—up 15 per cent to about $4.5 billion; religious—will hit $1 billion for the first time; public utility—up to $5.5 billion; industrial—up 30 per cent to $2.5 billion; farm—down 10 per cent; highways—another $5.8 billion year; public education—up slightly to

$2.8 billion; sewerage and water—up 10 per cent to $1.7 billion; military—to remain close to '59 level of $1.5 billion.

In Asia: Laying Plans to Build a Boom

Asia is getting set for its greatest economic boom. By 1965, it will have the capacity to produce 88 million tons of steel ingots, including Red China's forecasted 44 million tons and North Korea's 1 million tons. Last year, Asia turned out about 25 million tons. Japan, which produced 17.5 million tons this year, will double its production by '65. India should boost its production about sevenfold in the same period (Page 39).

FTC Reveals Corporate Sales, Profits

Sales of all U. S. manufacturing corporations in 1959's third quarter totaled $83.1 billion—down $5.2 billion from the previous quarter. Net profits dropped $1 billion to $3.8 billion. That information was released last week by the Federal Trade Commission. Here's how metalworking fared (in billions of dollars):

	Sales			Net Profits		
	2nd Q	3rd Q	% Change	2nd Q	3rd Q	% Change
All durable goods	46.1	40.1	−13	2.71	1.63	−40
Transportation equipment	11.6	9.5	−18	0.68	0.29	−57
Electrical machinery & equipment	6.5	6.6	+ 1	0.30	0.29	− 3
Other machinery	6.9	6.6	− 4	0.40	0.35	−13
Fabricated metal products	4.3	4.5	+ 5	0.16	0.19	+19
Primary metals	9.3	5.2	−44	0.73	0.03	−96
Instruments, related products	1.2	1.2	0	0.07	0.09	+29
Furniture & fixtures	1.0	1.1	+10	0.03	0.04	+33
Nondurable goods	42.3	43.0	+ 2	2.15	2.19	+ 2

GE Unshackles Its Front Line Supervisors

Keep your eye on a new management concept developed at General Electric Co.'s Large Steam Turbine-Generator Dept., Schenectady, N. Y. Foremen have been upgraded to "managers of shop operations." They control production, scheduling, methods, costs, personnel relations. Staff specialists report to them. The switch is paying off in greater productivity and better labor relations (Page 42).

Scrap Shipments to Rise in '60

Expect shipments of iron and steel scrap by processors and brokers to total between 32 million and 34 million gross tons in 1960. That compares with 28 million tons in 1959. Domestic demand in '60 will account for about 30 million tons (vs. 24 million in '59). Here's where most of the scrap came from this year: 9.5 million tons from metalworking plants, 650,000 tons

from foundries, 3 million tons from railroads, 3 million tons from old automobiles, 1.25 million tons from plant demolition, more than 1 million tons from farmers, 750,000 tons from shipwrecking, 200,000 tons from detinning operations, 350,000 tons from public utilities.

1960: A Better Year for Rails

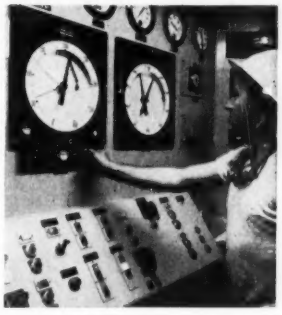
Expect railroad profits and capital expenditures to rise next year. But to make any sizable gains, the carriers will need labor peace, tax relief, and authority to diversify. Depreciation policies rank as a top problem for the roads; it takes a carrier 25 years to accumulate $3000 on a freight car where the replacement cost is about $10,000 (Page 41).

Copper Producers Organize to Find New Uses

Six major copper producers have organized the Copper Products Development Association Inc. to sponsor studies on new uses for the metal. Membership will be open soon to any copper producer. Charter members are American Metal Climax, American Smelting & Refining Co., Anaconda Co., International Nickel Co. of Canada, Kennecott Copper Corp., and Phelps Dodge Corp.

Acme Steel Automates Oxygen Converters

Automation of oxygen converters keeps steel analysis close to specifications at the new Acme Steel Co. plant in Riverdale, Ill. Instruments govern the process. Two identical systems operate the two converters. Recorder-controllers regulate oxygen flow and the egress of water to an exhaust cooler that protects precipitators. In its first attempt at steel production (it has been a fabricator), Acme has poured $33 million into a plant (Page 80).



Aluminum Looks to Housing for Gigantic Growth

The average amount of aluminum used per new house built in the U. S. will zoom to more than 1000 lb by the end of the 1960s (vs. 130 lb in '58), contends William H. Slemp, manager of residential building development for Kaiser Aluminum & Chemical Corp. It would give the aluminum industry a market for around 700,000 tons yearly. One reason, says Mr. Slemp, is that the second-time home buyer (he accounts for 60 per cent of today's home purchases) demands a home with low maintenance costs. Mr. Slemp

says aluminum can save up to $4000 in maintenance during the life of an average mortgage.

1960 Outlook for Rubber, Chemicals

Expect the chemical industry to chalk up record sales of $28 billion in 1960 vs. an estimated $25 billion this year, reports Manufacturing Chemists' Association . . . World consumption of rubber will increase 5 per cent next year to about 4.2 million long tons, believes Harvey S. Firestone Jr., chairman, Firestone Tire & Rubber Co.

New Way to Halt Air Pollution

Johns Hopkins University's radiation lab has a new technique for producing foamed plastic smoke that will remain in the air longer than smokes now used for shielding, screening, or signaling. One application being considered: The decontamination of polluted air.

Whatever Mama Wants—It's in the Lab

Almost anything your wife desires in the appliance field can be developed in the laboratory; the limiting factor is industry and consumer acceptance of the new ideas, says Herman F. Lehman, GM vice president, and general manager, Frigidaire Div. Some of the exciting innovations he suggests: 1. Wash the windows in your home by pushing a button. 2. Prepare meals with an electronic computer. 3. A device that will sort, wash, dry, iron, and fold your clothes. 4. An electrically refrigerated lunchbox. 5. The ability to scrub the kitchen floor by pressing a button on the dashboard of your car.

Pilotless Jets in Five Years?

By 1965, passenger jets will be taking off and landing with nobody at the controls, predicts William P. Lear, chairman, Lear Inc., Santa Monica, Calif. He believes future transports will carry four separate autopilot systems—a bid for reliability. He says the secret to reliability is "an abundance of redundance."

Straws in the Wind

Robertshaw-Fulton Controls Co. plans to market a free piston refrigerant compressor for air conditioning in 1961 . . . American Motors Corp. plans to build 33 per cent more cars in the first half of '60 than it did in this year's first six months . . . E. I. du Pont de Nemours & Co. Inc. says the average selling prices of its products today are lower than in 1949 . . . Factory sales of transistors totaled 66.6 million (valued at $176.4 million) during the first ten months of this year vs. 36 million (valued at $83.7 million) in the like '58 period . . . Beech Aircraft Corp. sold $6,670,000 worth of business aircraft in November for its biggest month in history . . . Cash dividend payments by firms issuing public reports amounted to $380 million in November . . . Business failures edged up to 1130 in November from 1125 in October.

ONLY the NEW MARVEL NO. 81A

High Speed HEAVY DUTY Band Saw can cut miters AUTOMATICALLY

The unequalled versatility, speed, and accuracy of the MARVEL No. 81A Heavy Duty Universal Hydraulic Band Saw, equipped with Shuttle Type Automatic Bar Feed, makes it the only truly multi-purpose production band sawing machine on the market. There are many jobs in metal sawing that *only* the MARVEL No. 81A can do.

For example, take automatic miter cutting. The vertical column (which travels forward to feed the blade through the fixed work) can be tilted up to 45° right or left of vertical. Work of any length can be laid directly on the machine (with no overhead interference) or positioned longitudinally on the roller tables by means of manual power control of the shuttle bar feed.

Feed pressure, blade speed, and length gauge can be set- or changed instantly, even during the sawing operation. The machine will make repetitive angular cuts (or square cuts) automatically without operator attention, with length accuracy held to .005" until the stock is used up.

The exclusive MARVEL "Sure-Line" Automatic Blade Control continuously senses and automatically corrects any tendency of the blade to drift off-line, insuring accuracy of cut.

The new MARVEL No. 81 and 81A Series Band Saws—(capacity 18" x 20") are the most advanced band sawing machines on the market. Before you buy *any* saw, see the MARVEL No. 81 Series.

Write for illustrated catalog and full details.

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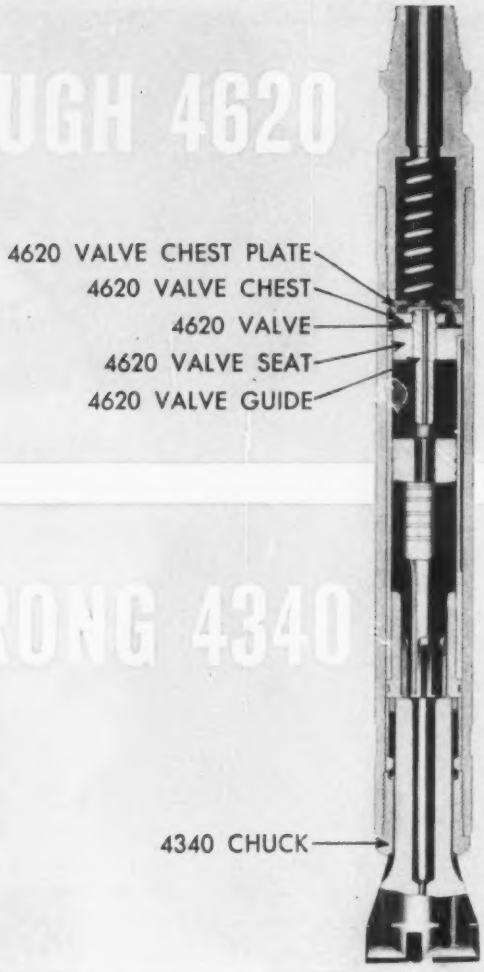
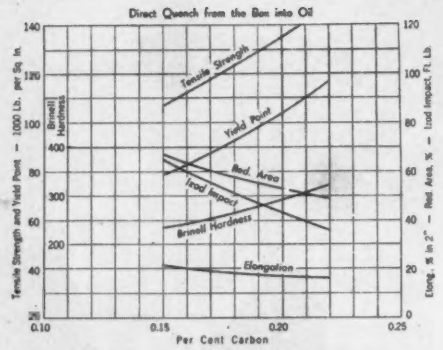
MARVEL Metal Cutting SAWS
Better Machines–Better Blades

TOUGH 4620

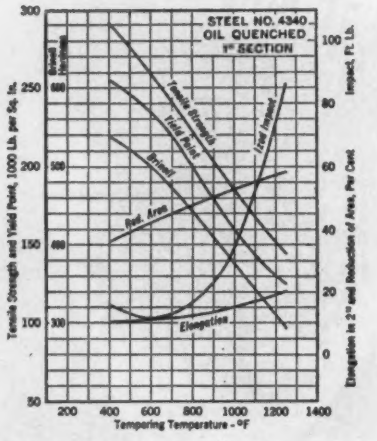




Average core properties of 1 inch bars, pseudo-carburized at 1650-1700° F. and heat treated as indicated. All bars tempered at 300° F. after treatment.

STRONG 4340

4340 CHUCK



Proof from Ingersoll-Rand that "just two will do"—4620 and 4340

Just two versatile general purpose nickel alloy steels do virtually everything the designer might ask of a "beefed-up" steel.

The Ingersoll-Rand "Downhole" drill points this up. Notice that extra *tough* 4620 or extra *strong* 4340 take care of all major critical parts. Mind you, this is in equipment that takes about as severe a beating as you can imagine.

And what has been done in the "Downhole" drill design can be done in tool after tool, machine after machine. Imagine how standardizing on these two steels, simplifies, and saves money!

A.I.S.I. 4620; C .20, Ni 1.80, Mo .25 This steel develops a hard case for good wear resistance with a bonus in core toughness (see chart) and impact resistance. Its reliability and minimum distortion in heat treatment give an added plus in processing of parts having critical tolerances.

A.I.S.I. 4340; C .40, Ni 1.80, Cr .80 Mo .25 Notice that 4340 steel is used for the chuck, a critical part requiring a combination of high impact and wear but where strength is paramount. Oil quenched and tempered, 4340 is just the steel for this use.

Make yourself acquainted with the ways nickel alloy steels can improve the performance of your equipment. These 2 steels are readily available from your Steel Service Center. Where metal difficulties develop with a special part, call on Inco for possible solutions.

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NICKEL MAKES ALLOYS PERFORM BETTER LONGER

No New Steel Strike!

The questions in the minds of practically everyone we talk to these days are:

1. Will the steel strike be resumed when the Taft-Hartley injunction expires on Jan. 26?
2. When the settlement comes, will it be inflationary enough to force steel prices higher?

Frankly, at the time this is being written, there are no pat answers. But there is plenty of evidence on which to base conclusions:

The steelworkers themselves have no stomach for renewal of the strike. Neither do their wives.

Yet straw votes indicate that only a minority of the workers will accept the companies' last offers.

The offers from 93 companies were scheduled to be filed today (Dec. 28) with Chairman George W. Taylor's Presidential fact finding board preparatory to a report to the President on Jan. 6.

Even if the workers approved the offers at an NLRB election in mid-January, the vote would not be binding on the union.

If the workers turned down the offers, as expected, and there is no settlement by Jan. 21, Atty. Gen. William P. Rogers would be obliged to dissolve the injunction by Jan. 26 and the strike would resume.

But will it? We think the answer is "no."

Despite the apparently immovable positions of the union and the companies, the pressures on both sides for a settlement have been steadily mounting.

One source of pressure stems from the growing list of steel, aluminum, and copper companies already signed up as the result of what might be called divide and conquer tactics.

The chief source of pressure comes from the government. Various antistrike measures are being given feverish attention in Washington. Secretary of Labor James P. Mitchell says a new strike would be "unthinkable."

The President, too, is authorized to make a complete report to Congress and recommend fast action on restrictive legislation. It probably would be unpalatable to management and labor.

The pressures, we feel, add up to the reasonable expectation of an industry-wide steel settlement by Jan. 26.

Since the offers are already inflationary, we think the answer to the second question is "yes." The terms of the signed contracts will inevitably result in higher steel prices.

Irwin H. Such

EDITOR-IN-CHIEF

MEETING *of* MINDS!

Each of these men has an expert mind in his field—administrative, sales, finance, raw materials, production. Each contributes years of practical experience, rigorous theoretical knowledge and proven executive ability. Together they constitute Inland Steel Company's Products and Facilities Planning Committee—keeping a watchful eye on consumer and industrial trends and requirements, guiding the company's development and expansion.

To their attention are brought market studies, design forecasts, new product possibilities, material resource potentials, new production methods, future equipment needs. They are excellent listeners, they travel often to see for themselves, and they are doers—initiating programs which have upped Inland's steelmaking capacity 15% to 6,500,000 ingot tons in just three short years.

The work of this committee, like the future of America's expanding economy, is never ending. Keeping pace with midwest industrial growth, Inland completes each stage in its expansion plan and looks ahead . . . for the next job.

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Public Pushes for Steel Settlement

PUBLIC pressure mounts for settlement of the steel dispute.

The latest evidence will come today when Dr. George W. Taylor reconvenes the panel of fact finders to learn the status of negotiations. Although they are likely to get the official word that negotiations are still stalemated, they'll probably urge both sides to keep trying. Behind the scenes, both sides are being warned about the dangers of letting Congress stop a walkout.

The fact-finding panel in the steel dispute reconvenes today. Left to right: John A. Perkins, president, University of Delaware; George W. Taylor, Wharton School, University of Pennsylvania, panel chairman; Paul N. Lehoczky, Columbus, Ohio

• **Procedure**—Last week the panel directed the steel companies to make their final contract offer by today. That's the one the workers will vote YES or NO on after Jan. 6, unless a negotiated settlement can be reached before then. Outlook for such a development is poor.

The National Labor Relations Board has held ten other "last offer" elections since the Taft-Hartley Act was passed, but none will be as big or as complicated as this one. The board is reluctant to give details of the voting mechanics until the Jan. 6 deadline for fear of giving the impression that negotiations are frozen. Elections will be separate in the 96 steel companies, but the results will be computed on a national basis. The union is not legally bound to follow the will of the majority in the unlikely event that the members vote to accept the companies' last offer.

• **Morale**—While the national vote is almost certain to go for the union, it's also a reasonable bet that some pockets of the membership in companies or divisions of companies will vote against the union. If the USW calls a national strike, its leadership may be severely tested in persuading everyone to go along.

In its electioneering last week, the steelworker bosses were also going to some pains to explain why the contracts with the can, aluminum, and copper companies contain no 2-B clauses on work rules. Steelworker President David J. McDonald said the can pacts had provisions "like 2-B." The can companies denied it. Actually, work rules haven't been an issue in the other industries because the companies have steered clear of the 2-B-type clauses in the past. "We've never had them," one company spokesman told STEEL. "The union tried to work them into the new agreements, but we told them nothing doing. They didn't make much of an issue of the matter."

• **The Aluminum Settlement**—The aluminum producers signed with USW Dec. 19 a contract that will expire July 31, 1962. The union estimates it will be worth 30 cents an hour; the companies' estimates vary from 28.5 to 28.7 cents. The contracts (with Aluminum Co. of America, Kaiser Aluminum & Chemical Corp., Reynolds Metals Co., Ormet Corp., and Olin Mathieson Chemical Corp.) vary slightly, mostly in the value of the first year's wage increase and in the benefit programs. Variations in benefits arise because of wide difference in age and service of the working forces involved.

But a good picture of the settlements can be had from a look at Alcoa's 28.5 cent-an-hour package. It calls for: Direct wage increases averaging 4.8 cents the first year, 7.1 cents the second, and 8.9 cents the third, for a total of 20.8 cents in wages. The remaining 7.7 cents goes for pensions, insurance, and other benefit programs. The contracts also call for cost-of-living increases of up to 3 cents an hour in each of the second and third years. Under terms of the extension agreement, all first year wage gains are retroactive to Aug. 1, 1959.

• **More Contract Signings**—Two of the companies still have to come to terms with the Aluminum Workers International Union—AFL-CIO, but the signing will probably be little more than a formality. Alcoa

How Responsible Is the United Steelworkers?

"As an example of how the steel industry is engaged in price gouging, there is a fabricator whom I know in Pittsburgh who used to buy steel for $150 from a mill and now is being forced to pay $450 from a warehouse. Even if you buy structurals in 100 lb lots, you don't get up to 22 cents a pound."—David J. McDonald.

The United Steelworker president cited that illustration on television while being interviewed with Joseph L. Block, chairman of Inland Steel Co. Mr. Block tried to get specifics on the alleged example but could not pin down Mr. McDonald.

"After hearing of the McDonald statement, this wire was sent to the union president by Robert G. Welch, executive vice president, Steel Service Center Institute:

"We are deeply concerned by the reference made to prices charged by mill owned warehouse in Pittsburgh to your friend, the steel fabricator. Your statement greatly surprises our segment of the steel industry which has made every effort to perform the maximum public service during the strike by satisfying all possible needs . . . at the minimum cost. There must have been some unusual circumstances surrounding this isolated case, or you were provided with incomplete information. Since your statement was made, we have received many inquiries in this regard, and we would appreciate the details regarding the circumstances surrounding the case to which you refer. So that we may intelligently reply to these inquiries, would you please provide details on the name of the supplier, the fabricator, the quantity, size and specification of the items purchased, as well as any other pertinent details you have available?"

This answer came from Mr. McDonald:

"Re your telegram. A serious investigation by you would indicate that the situation I mentioned is not isolated. I will not supply you with the names of the people involved for obvious reasons."

has already signed an identical agreement with AWIU. Alcoa also has to work out a contract with the United Auto Workers. Several companies also have to deal with smaller craft unions, but in each case the USW pattern is expected to prevail.

• **Prices Action Later**—Hints that the price of aluminum might be bumped again when producers feel world market conditions are ripe can be read into the statement by producers that the recent 1.3 cent a pound bump doesn't reflect additional employment costs but rather a restoration of the price that was in effect before April, 1958.

• **Copper Unions Still Skittish**—If the aluminum companies have found the labor seas calm, the copper industry has found them choppy. Kennecott Copper Corp., which signed a 20 month agreement with the USW in November, still faces a holdout by the International Union of Mine, Mill & Smelter Workers. The company and Mine-Mill have agreed on a 22.3 cent an hour economic package but are still miles apart on local issues. It's unlikely now that we'll see a settlement there before the first of the year. Elsewhere, Mine-Mill is considering offers made by both Phelps Dodge Corp. and the Anaconda Co. Both offers are in the area of the Kaiser package which has set the pace in nonferrous negotiations.

• **Influence on Steel**—How will the USW-nonferrous and can settlements affect the steel negotiations? Chief Negotiator R. Conrad Cooper doesn't believe they'll have any bearing on the steel dispute. "We have our own problem to deal with, and we'll try to deal with it properly," he says.

The industry has agreed to one union demand—separate company talks. But their response to the union's ten point demand of Dec. 18 was cold. It's tougher than the deal made with Kaiser Steel Corp., which the companies had earlier said was too expensive for them.

• **Summary**—Still critical is the steel situation. The last offer is expected to go to an election by the members who probably will turn it down; they want to support their union. The President or Congress, spurred by public pressure, will prevent another long strike when the T-H injunction expires Jan. 26.

One hope was being expressed more frequently last week. After the election, the industry may make a slightly sweeter offer that will be accepted by the USW, which fears Congressional action as much or more than industry does.

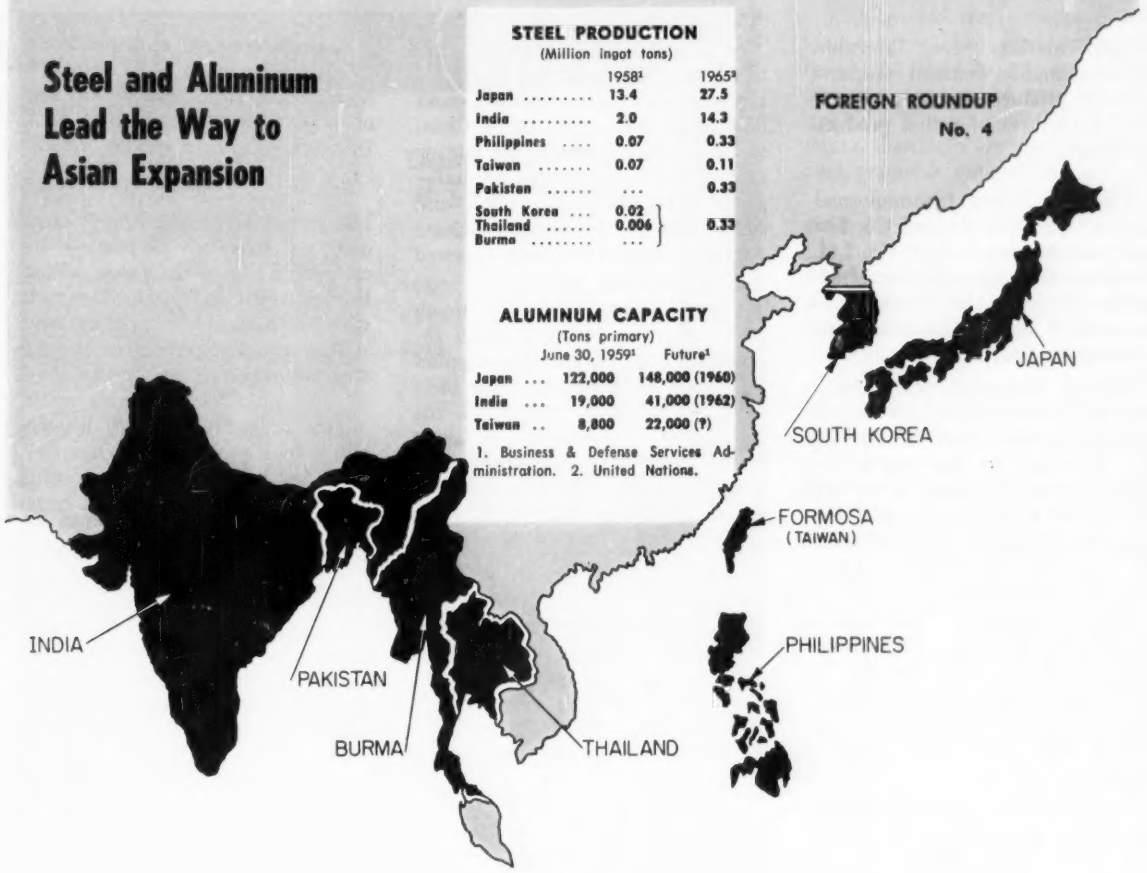
Even if that development would make short term U. S. action unnecessary, Congress is expected to pass some long term legislation to deal with anything like the steel case.

Phoenix Steel Turns Down British Bid to Build Mill

Phoenix Steel Corp. has turned down an offer by a group of British manufacturers to finance and build a new steel plant in New Jersey.

J. A. Sisto, chairman, said the action was taken because of "burdensome changes introduced in the proposed contract."

This should not be construed as abandonment by the company of plans for modernizing and expanding its facilites, the chairman points out. Several alternate plans are under consideration.



Asia: Japan Sets Fast Growth Pace

ASIA is on the threshold of its greatest economic boom. Spurred by healthy economic conditions in the U. S. and Western Europe, a rising trend to industrialize at home, and the rivalry between the Free World and the Soviet Bloc for friends and markets, the continent's over-all economic position has no place to go but up.

• **Steel and aluminum capacities are on the increase.** By 1965, the United Nations predicts Asia will have the capacity to produce about 88 million tons of steel ingots, including Red China's forecasted 44 million tons and North Korea's 1 million tons. In 1958, Asia produced about 25 million tons, including 8.8 million tons by Red China, and 400,000 tons by North Korea, says the Business & Defense Services Administration.

The outlook for Japan and India is particularly bright. Japan, which produced about 17.5 million tons of steel this year, will nearly double its production by 1965. India should boost its production about seven times in the same period, officials predict.

Expansion in the Japanese aluminum industry has followed a route typical of that taken by many Asian countries. Tax concessions by the government permit rapid depreciation of new equipment. Links between domestic fabricators and foreign firms provide technical assistance and marketing knowhow. This year, Furukawa Electric Co. and Aluminum Co. of America formed Furukawa Aluminum Co. to engage in the fabrication of aluminum, magnesium, and zinc.

The new company will market its products in Asia.

Aluminium Ltd. owns 50 per cent of Nippon Light Metals Co., one of the three primary aluminum producers in Japan.

BDSA notes that controls on foreign trade in aluminum have also encouraged development of the domestic industry. Imports of primary metal are authorized when

foreign markets are favorable. When domestic demand slackens, primary producers give a special price to makers of rolled products for export.

• The two largest Japanese steelmakers, Fuji Iron & Steel Co. Ltd. and Yawata Iron & Steel Co. Ltd., have recently received loans of $44 million through the World Bank to assist in modernization and expansion programs.

Current expansion plans represent the second largest growth program undertaken since World War II. By 1962, at the end of the current plan, Japanese firms will be capable of producing 20.5 million tons of ingots. In 1956, when the program was begun, capacity was 11.1 million tons.

Higher quality products and a wider range of products will be another result of the Japanese effort. The country is also expanding its pig iron capacity to avoid greater dependence upon imported scrap iron and steel.

Between them, Fuji and Yawata have current expansion plans costing almost $200 million.

Japan's bearing industry is typical of its other metalworking industries. Producing 60 million units annually, exports to the U. S. now total well over $100,000—just three years ago, they were negligible. Total exports amount to $3.8 million. Latin America, Thailand, and India are the chief markets.

Japan is the second best customer of the U. S. In turn, the U. S. buys more goods from Japan than any other country in the world, except the United Kingdom and Canada. That the situation might not last forever is indicated by declining U. S. exports to Japan since 1957. Japan also continues to restrict the entry of a large number of products from the U. S. Copper and steel scrap and pig iron are among the restricted items, as well as manufactured goods like autos, some industrial machinery, and some big consumer items like air conditioners and television sets.

• Aided by public and private investment from the U. S. and the USSR, India seems about to take the "great leap forward" that the Red Chinese have been claiming.

India will be industrialized—that is certain. A challenge to U. S. businessmen to get in on the ground floor is thrown out by D. N. Chatterjee, Indian Embassy, Washington: "We need foreign capital—particularly American capital—and so far only $120 million of private American capital has been invested in our country."

But the country is doing much for itself. The National Small Industries Corp., for example, supplies machinery on a hire-purchase basis to small industries which lack the cash to buy equipment. So far, it has provided 2900 machines worth over $5 million. Applications are on hand for another 10,000 machines.

Another development vital to India: The modernization of her ports; $163.8 million will be spent to double her port capacity, if proposed plans are adopted.

Housing needs are set at 26 million new homes from 1961 to 1976.

How fast can India develop? In the first five year plan (1951-56), national income increased by 18 per cent, or 3.5 per cent per annum. Total investment was $6 billion, a healthy 50 per cent increase over India's past investment rate. However, that growth rate barely kept ahead of rising population, so the improvement in standard of living was marginal.

• Here is a roundup of several other Asian nations where some important developments in metalworking are occurring:

Pakistan—The World Bank has loaned over $150 million to India's neighbor for railroads, electric power, port improvement, natural gas pipelines, agricultural machinery, and a pulp and paper plant.

Sign of the times: Karachi, the capital city, will have an airport capable of landing commercial jet transports by 1961.

Philippines—Talk of a steel plant in the Philippines continues, although there are no signs of an early agreement. Filipino trade with the U. S. declined this year as tight fiscal controls were instituted.

The U. S. Embassy at Manila reports all business activity has slowed its expansion rate.

South Korea—Its economy heavily dependent upon American aid, South Korea is just nearing the end of its postwar reconstruction period. Inflation remains a serious threat.

Hong Kong—With the U. S. its leading market, Hong Kong's economy advances on all fronts. Increased trade with Japan, West Europe, and Canada, and less trade with its Asian neighbors is the rule.

Sixty per cent of the colony's industrial output is in textiles.

Thailand—This country has begun a drive to attract new industry. A U. S. investment survey team, which returned last month, notes "little, if any, hostility toward private business." The government is considering a proposal to exempt productive machinery from import duties.

Malaya—Industrial production is up and trade prospects are bright. The U. S. is the Federation's best customer, but the USSR is becoming a more significant factor. Competition from synthetic rubber concerns the country seriously.

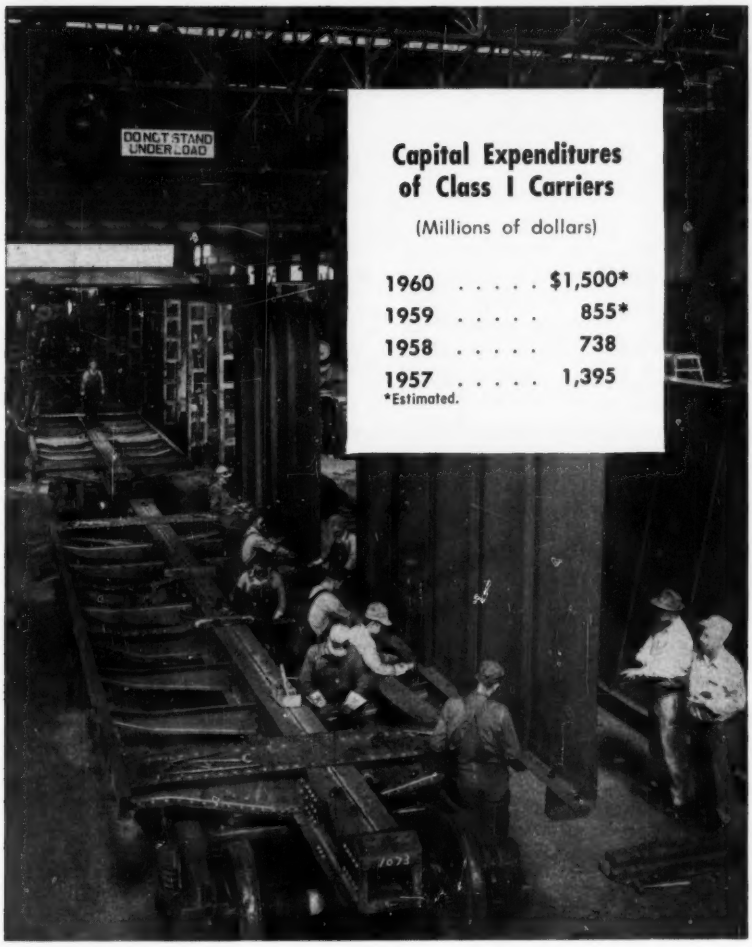
Tin remains in a semidepressed state. The government wants a more diversified industrial complexion and grants tax concessions under the Pioneer Industries Ordinance of 1958. Over ten firms have been issued "Pioneer Certificates"; proposals for certification cover 27 new industries and 118 products.

Cambodia — This rubber based economy may be experiencing a slight pickup. Imports will be increasing, particularly from the U. S. and Red China. Exports to the U. S. are on the rise.

The country has a few processing industries in the early stages of development.

Indonesia—This nation devaluated its currency earlier this year, and the government is increasingly concerned about inflation. Stabilization of the economy must be achieved before expansion can be contemplated.

This is the fourth in STEEL's *Foreign Roundup series. Previous articles surveyed Latin America, Europe, and the Soviet bloc. An extra copy of each article is available until the supply is exhausted. Write Editorial Service,* STEEL, *Penton Bldg., Cleveland 13, Ohio.*


DO NOT STAND UNDER LOAD
Capital Expenditures of Class I Carriers
(Millions of dollars)
1960 . . . . . $1,500*
1959 . . . . . 855*
1958 738
1957 1,395
*Estimated.

Illinois Central Railroad.

Railroads Forecast Higher Profits and Expenditures

RAILROADS expect rising profits and capital expenditures next year. The success of the forecast is influenced by prospects of labor peace, tax relief, and authority to diversify.

Income this year will not show an appreciable improvement over 1958's ($443 million in the first ten months vs. $451 million), but the prospects of a booming year and the needed replacement of rolling stock are calling for major spending.

The projected figure for capital expenditures by Class I railroads is $1.5 billion—a healthy boost over $885 million in 1959 and $738 million in 1958.

Main emphasis will be on freight cars and locomotives. A gage for comparison are the cars installed and delivered in this and former years: 34,254 in the first 11 months of 1959, 39,278 in 1958, and 88,482 in 1957.

The backlog of freight cars on order and undelivered as of Dec. 1 was 36,555, of which 18,357 were in shops of contract builders and 18,198 were in railroad shops. Freight cars ordered in the first 11 months totaled 45,854.

Rolling stock replacement is still inadequate. The serviceable rail freight car fleet is just over 1,550,000 cars, near an 18 year low and some 17,000 cars below the July 1 figure. Shortages are chiefly in hoppers, gondolas, and special cars.

● **Depreciation**—Acquiring the capital for property replacements is a problem. Through depreciation charges it takes a carrier 25 years to accumulate $3000 on a freight car; replacement costs about $10,000.

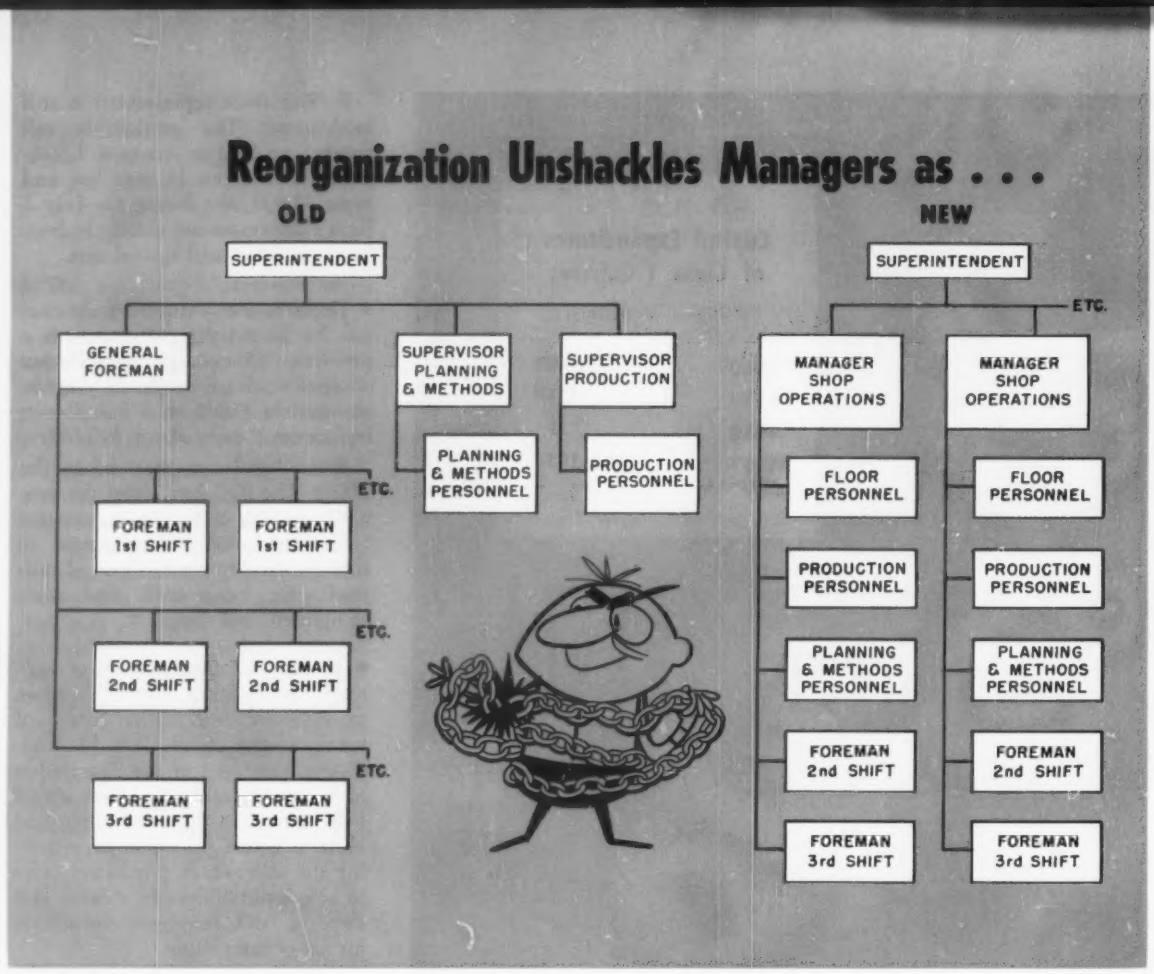
Some legislation may be in the offing. The ICC has joined the Senate Interstate & Foreign Commerce Committee and other groups to shorten the depreciable lives of railroad cars, locomotives, and other equipment and property.

● **Chance to Compete**—The railroads are seeking greater freedom to diversify into other forms of transportation. Says Clair M. Roddlewig, president of the Association of Western Railroads: "This would help correct a long standing and basic injustice . . . that of requiring the railroads to pay heavy taxes to help build highways, airways and airports, and improved waterways for use of competitors."

Mr. Roddlewig states that the railroads want the same chance at intercity freight traffic that is now handled by unregulated truckers. He points out that transportation of intercity freight by trucks and barges not subject to ICC regulation has grown to almost half the total movement.

● **Brakes on Rates**—In recent months, the railroads have trimmed freight rates on certain items, including iron ores and autos. Industry officials conclude that the long uptrend in over-all rates has been halted. The carriers have not received any general freight rate increase since February, 1958.

● **Featherbedding**—Rail unions condemn management's proposals to overhaul work rules to eliminate featherbedding. The rails' resistance to wage increases threatens to trigger a national strike. Negotiations are underway to reach agreement on a new contract to supplement the three-year pact and a moratorium on work rule changes which expired Oct. 31.



GE Upgrades Production Management

A NEW KIND of first line supervisor has come into being via General Electric Co.'s work to develop a more dynamic production management. Result: Some time-honored factory concepts, involving general foremen, staff specialists, and production supervisors, are being scrapped at the firm's Large Steam Turbine-Generator Dept., Schenectady, N. Y.

"Traditionally, we had placed a foreman in charge of an operation and a group of people to perform this operation and had thought of him as a manager," explains GE's N. C. Jones, department superintendent of manufacturing. "At the same time, however, we surrounded him with specialists in methods, planning, and production, each reporting to a higher manager of the specialty involved. In practice, each specialty organization was emphasizing its own specialty without thorough integration of the total operation. In cases where these interests conflicted with the over-all interests of the operation, the resultant disputes had to be carried to the general foreman or superintendent for settlement."

• To resolve conflicts and give full production management to first line supervisors on the floor, the department has revamped its production organization into the streamlined model diagramed above.

The first line supervisor, now called a manager of shop operations (MSO), has complete responsibility and control of every facet of his operation, be it production, scheduling, methods, costs, personnel or labor relations. Staff specialists who monitor production now report to, and not above, him.

Today, the department has 35 MSOs, each responsible for 40 to 160 men. In contrast, 300 men previously were assigned to a general foreman; 25 to 30 were supervised by a foreman. To set up the new organization, the department analyzed its manufacturing job and divided it into manageable pieces or units. The MSO position was created to manage each unit and make it economically and functionally autonomous. The MSO is "boss," from the budgeting and forecasting of operations to the con-

trol of costs and performance. He may have 7 to 17 production and planning specialists reporting to him.

• Advantages of the MSO concept range from higher production to smoother labor relations.

The department has found that MSOs can spend more time on the production floor, less time chasing down tools and vouchers and attending meetings. Other benefits:

• Responsibility has been pinpointed and buck passing eliminated. If the priority of an order is mixed up, the MSO has sole responsibility.

• Up and down flow of information is better than it was under the general foreman setup. Shorter lines of communication run from hourly workers, via the MSO, to the superintendent.

• Production has improved. With greater accessibility to his group of specialists, the MSO can quickly discover and correct slowups.

• Relations between the supervisor and engineering section are better. By eliminating channels, the MSO and his specialists deal directly with the engineers upstairs.

• Grievances to be settled at the second step of the grievance procedure have dropped off because the MSO has authority to deal directly with shop stewards, backed up by his own technical specialists.

• The MSO concept, however, is not a universal solution and must be carefully tailored to the shop.

The most important factor is to examine operations, identify the necessary work elements, decide the optimum way of getting the work done and organize accordingly. Obviously, in a high volume, repetitive operation, it is often most economical to employ a preplanned flow concept under which all methods, planning, pricing, and scheduling are worked out before the order goes to the shop. Here, the factory supervisor has only to direct workers to execute the plans.

But in a job or intermittent production shop, it may be more economical to leave all those functions to a production chief like the MSO. He can do them before shop operations are to begin.

• Where the concept can be put to work, friction must be avoided with specialists, unions, and "displaced" foremen.

Switching to the MSO plan requires an essential upgrading of the key people involved, from managers to specialists and foremen. A continuing determination of how well an individual is adjusting to the new concept will rule out some; the department found some people who voluntarily asked to be removed because they knew they could not meet the requirements. A redistribution of people to positions most compatible with their abilities will usually work out to the satisfaction of all.

In the early transition stages, workers and the union may feel they have too many bosses, but the department found that careful reorientation and familiarization will smooth out such difficulties.

The payoff can be found in the usual measures of a company's business. Says Mr. Jones: "Our experience proves that with a well planned changeover, one never experiences a detectable loss but only gains all the way.

"In creating the MSO, we've really built up the first line supervisor," he adds. "The qualifications for the job and what it pays have been raised.

"Up to now, about everyone is happy. The hourly workers get better service. Superintendents are free to devote their time to broader management actions and decisions. Service groups find it easier to work with a technically equipped first line supervisor. And top management is happy with the improvement in cost and production figures."

Here's How the New Manager Works

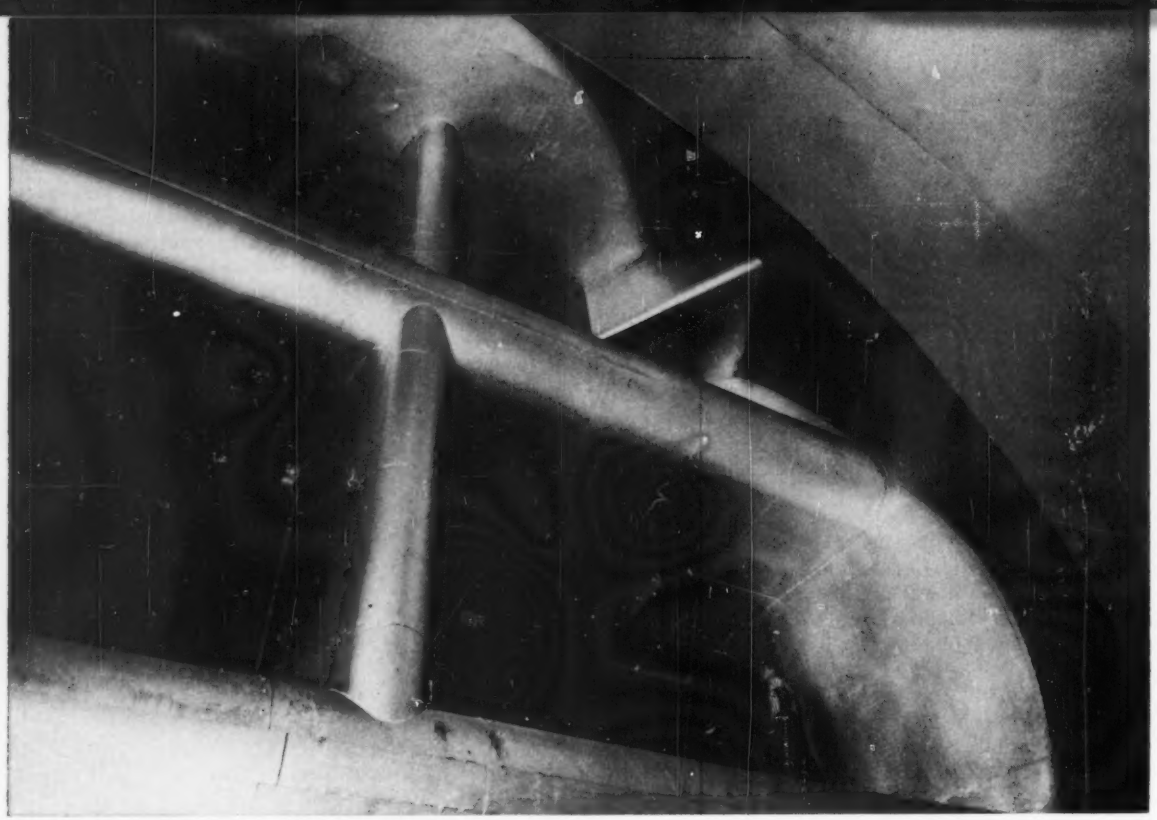
To see how the manager of shop operations (MSO) concept is working out, listen to this MSO, a former general foreman. He has 125 men assigned to him, including two night shift foremen and an office staff of 16.

He says: "Take job assignments. A foreman had the right to change a job assignment, but exercising that right was always a struggle. Administrative specialists insisted that the foreman submit his ideas through the general foreman or the superintendent to them. It's different with the MSO. Specialists deal with him directly.

"Or take production control. The head of it was about equal in status and authority to the general foreman. If something got balled up, or if there were differences of opinion, the superintendent had to straighten things out. Now, production is my own responsibility. We still have problems, of course, but we settle them right in this office.

"As an MSO, I'm much better equipped to settle labor problems than I was as a general foreman. Formerly, if a question came up as to whether a method change was substantial enough to justify a rate change, nothing could be settled without getting the foreman involved, and the shop steward, the methods and planning man, the general foreman and, frequently, the superintendent. Now, I have the technical information at my fingertips and, as the supervisor, settle things with the shop steward.

"The MSO has more authority than the old foreman, and the shop steward understands this. The same steward who would bypass the foreman with a grievance or gripe in hopes of getting more from someone at a higher level does not attempt this now. The MSO has full authority to deal with disciplinary problems, and the superintendent backs him up when there is a dispute."



GRILLE is for supersonic wind tunnel at Arnold Engineering Development Center, Tullahoma, Tenn. Wind velocities of the Air Force facility will range from 1000 to 3000 mph. Giant motors and compressors, built by Westinghouse Electric Corp., will develop 216,000 horsepower to produce the wind tunnel blast. Coolers behind the grille will circulate 65,000 gallons of water per minute to absorb heat from the airstream and carry it away

Wind Tunnel Blows Supersonic Blast

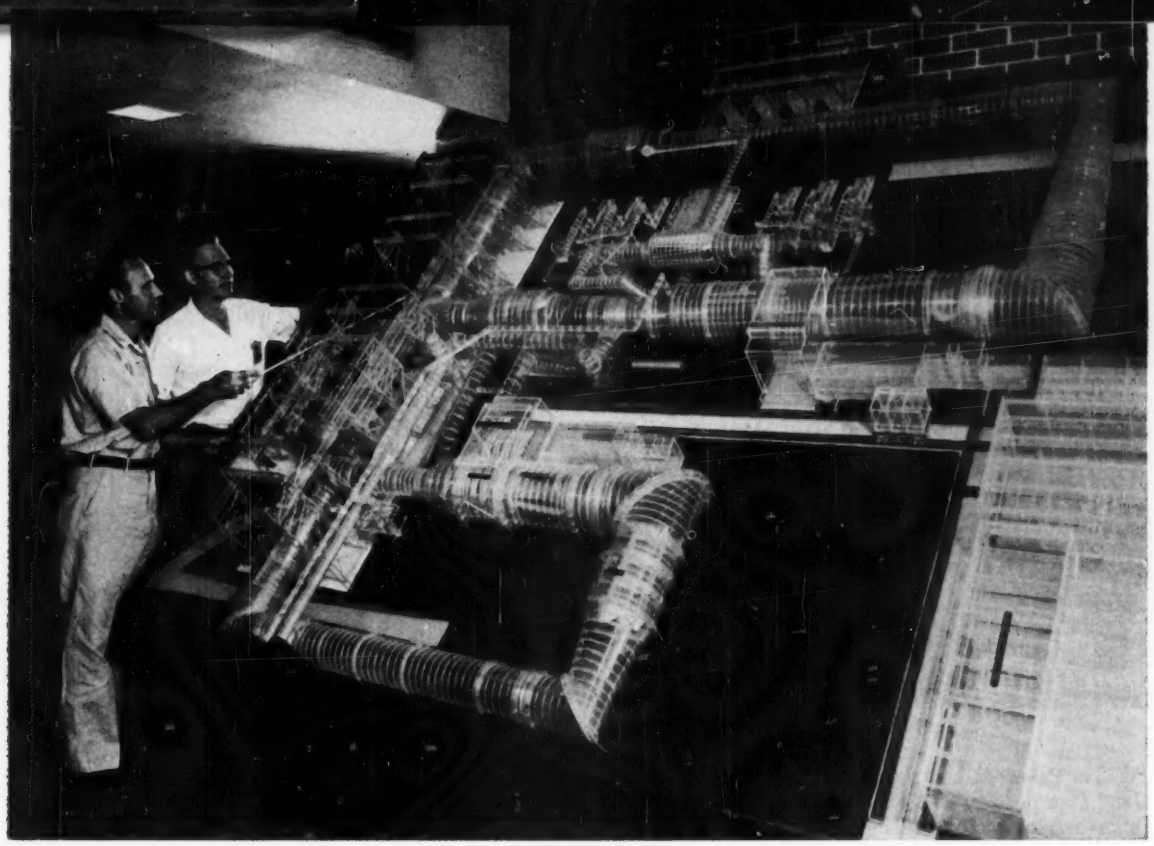
A HUGE rotating machine, built by Westinghouse Electric Corp., will power the Air Force's new, supersonic, propulsion wind tunnel nearing completion at the Arnold Engineering Development Center, Tullahoma, Tenn.

Largest of the 22 wind tunnels and test cells in operation at the center, the propulsion wind tunnel consists of a transonic unit already in use and the new supersonic circuit. The rotating machine which operates the wind tunnels is more than 480 ft long and develops 216,000 horsepower to simulate speeds of up to 3000 mph.

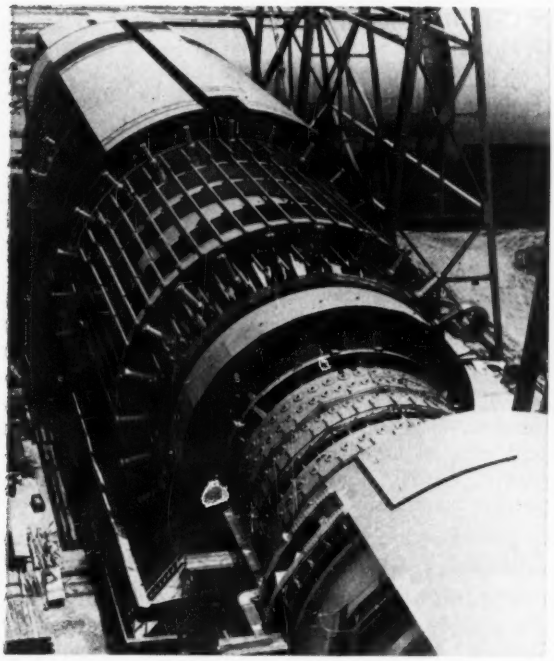
It includes two powerful synchronous motors, each rated at 83,000 horsepower, and two smaller "starting" motors of 25,000 horsepower each. The four motors, built at Westinghouse's East Pittsburgh plant, are connected in tandem to drive two mammoth compressors—a three stage unit for the transonic circuit, and an 18 stage unit for the supersonic circuit. The compressors were built at the Westinghouse Manufacturing Div., Sunnyvale, Calif.

Occupying a 41,000 acre tract, the Development Center is part of the Air Research & Development Command, which is responsible for over-all Air Force research and development. ARO Inc., a subsidiary of Sverdrup & Parcel Inc., St. Louis, operates the center for the Air Force. Construction of the wind tunnels and propulsion system test cells is supervised by the U. S. Army Engineers.

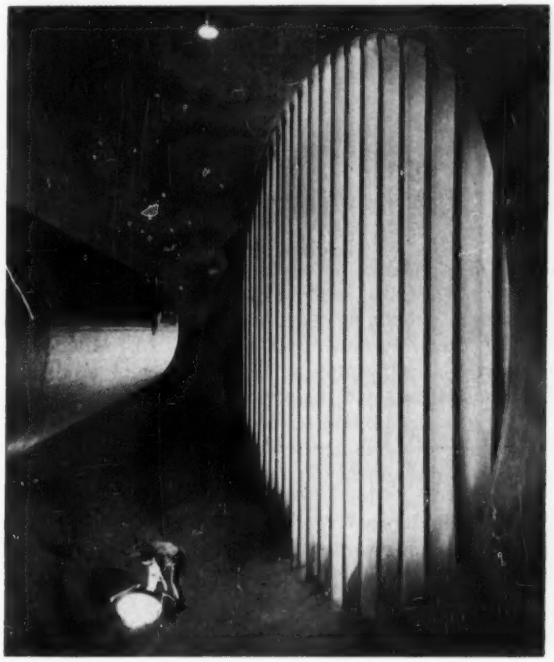
The center's transonic circuit, in operation for nearly three years, has conducted aerodynamic and propulsion tests on more than 30 of the major U. S. weapon system projects. Some of the jobs it has been used on: The USAF Titan, Snark, GAM-72 and Bomarc missiles; nose cones for all the intercontinental ballistic missiles; the U. S. Navy's Polaris submarine missile; the Army's Jupiter, and the National Aeronautics & Space Administration's Mercury project.



PLASTIC SCALE MODEL of the Air Force supersonic and transonic wind tunnel circuits is discussed by Lt. Col. C. R. Flint, USAF, left, and Roger Draft, project engineer for Westinghouse. Colonel Flint points out what are said to be the world's two most powerful synchronous motors, each developing 83,000 horsepower. The supersonic wind tunnel circuit is shown in the upper half of the display table, the transonic circuit in the lower half



THIS COMPRESSOR SECTION forms part of the business end of the giant rotating machine which powers the tunnels. The machine develops 216,000 horsepower from the tandem hookup of four driving motors



VERTICAL STEEL VANES cut down air flow turbulence as direction of flow is changed in the supersonic tunnel. Diameter of the tunnel is 47 ft at this point and ranges from 32 to 62 ft in other sections

Mitchell Hopes Summit Talks Will Bring New Labor Pattern

WITH President Eisenhower back in the country, look for Labor Secretary James Mitchell's plans for a labor-management summit conference to take shape fast.

A meeting in February or March seems certain. Who will participate is another matter. The conference was formally suggested by AFL-CIO President George Meany to President Eisenhower several weeks ago. Mr. Meany met Secretary Mitchell four weeks ago for discussions described as "initial and exploratory."

The secretary of labor is now reported to be seeking out top leaders of industry to get their reactions to the idea and decide who should be invited. One rumor in Washington is that participants will be confined to six from each side. There appears to be some doubt as to whether the National Association of Manufacturers or the U. S. Chamber of Commerce will be asked to attend.

What Can Be Accomplished?

Like the plans for the international summit meetings of the heads of state to take place next year, the labor-management meeting is frankly designed, say informed sources, to set a trend, rather than to bring about formal agreements of any sort. Mr. Mitchell reportedly is acting only as a catalytic agent. And he is determined to avoid the appearance of formal agendas, or anything smacking of finality.

Industry leaders are reported to be indicating their co-operation, but they appear to lack enthusiasm. One reason is that the original suggestion seems to have come from labor (it's thought to be a brainchild of the United Steelworkers' counsel, Arthur J. Goldberg). Several industrial executives are said to believe that highly publicized meetings such as the proposed summit conference can easily be used by the unions to chastise management unfairly.

Others say such a meeting is precisely what Steelworker President Dave McDonald has demanded and Chairman Roger Blough of U. S. Steel has refused to grant in the current steel hassle. It is also noted that the IUE's Jim Carey has smarted under his supposed inability to deal directly with top General Electric Co. management.

Finally, some sources suggest that such summit conferences will raise the stature of the union leaders, and lower the stature of the management people ordinarily responsible for collective bargaining—the corporate vice presidents and directors of labor relations.

Significantly, union leaders generally approve the conference idea.

Looking at the Year 2000

A study paper of the Joint Economic Committee's current series on "Employment, Growth, and Price Levels," reveals this outlook for 2000: Population of the U. S. could range from a low of 268 million to a high of 433 million. The civilian labor force could include from 116 million to 173 million people. Gross national product (in 1959 dollars) may be as high as $3,210 billion, or as low as $1.630 billion. (GNP should almost certainly cross the trillion dollar mark by 1980.) Gross national product per capita should range from about $6000 to $7500 compared with today's $2730.

Demand for key raw materials will depend upon many factors, such as population, level of income, and availability.

The Joint Economic Committee's paper cites these figures as "medium" estimates of demand:

- Coal—756 million tons in 1980 and 978 million in 2000 compared with 385 million in 1958.

- Iron ore—197 million tons in 1980 and 270 million in 2000 compared with 140 million in 1957.

- Aluminum—10.6 million tons in 1980 and 24.3 million in 2000 compared with 1.9 million in 1958.

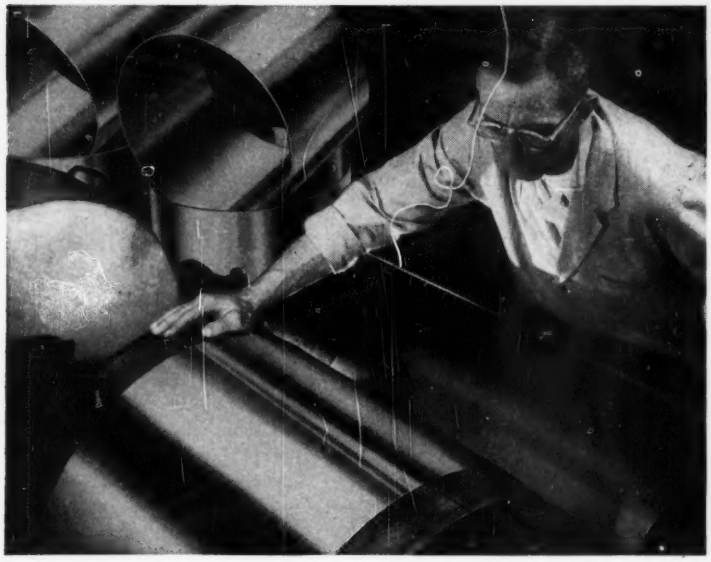
- Copper—4.1 million tons in 1980 and 8.9 million in 2000 compared with 1.56 million in 1958.

Admitting that such a far look ahead is full of pitfalls, the paper notes a change of one percentage point in labor productivity can result in a large change in GNP. Commenting on its forecast for aluminum demand, the paper suggests demand could increase 40 times in 40 years, or just three times, depending upon technological developments within the aluminum industry, as well as advances which are made in competitive materials.

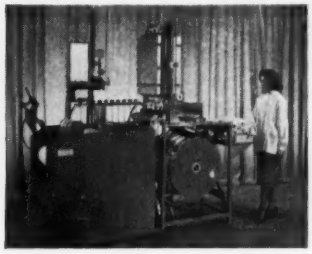
Adequacy of Metals for Our Growth

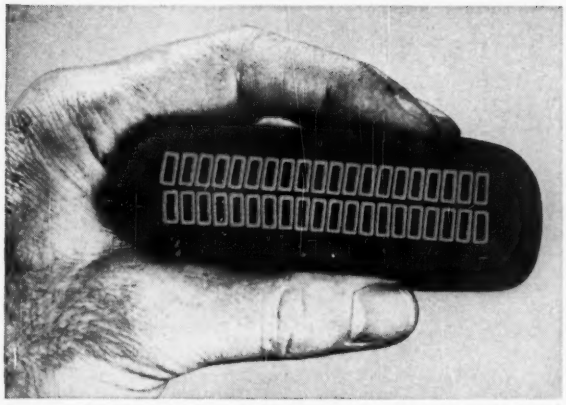
The JEC paper reports the "historical record" of supply and demand for metals in this country does not "portend disaster," when you count the technological development possible for using low grade ore reserves and the availability of metals from overseas. Biggest world demand will occur on the resources of iron ore, bauxite, copper, lead, and zinc.

BETTER WAYS of doing things with seamless copper tube are unlimited—from capillary sizes to 26-inch diameter—round tubes or special shapes.

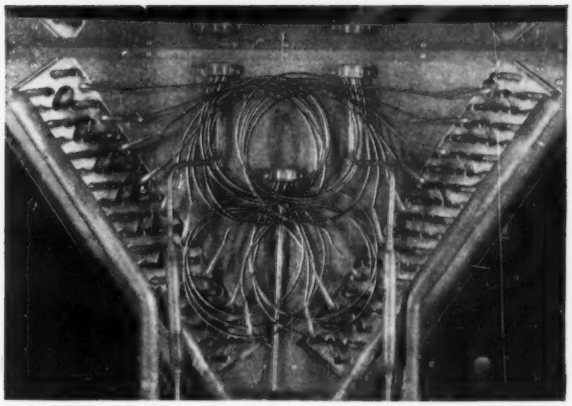


A better product faster. In the Kodak Roll Paper Dryer-Glazer shown below, photographic print paper travels around a heated, mirror-smooth, chromium-plated copper drum. This drum could be formed from sheet metal, welded and ground. But Eastman Kodak Company takes a production short cut and buys the drums ready made—Anaconda seamless copper tube 26″ inside diameter, in wall thicknesses of ⅛″, cut to 20″ lengths. Having the thermal conductivity and corrosion resistance needed, the tube is also easy to polish to a high mirrorlike finish (photo, left), provides an excellent base for fine chromium plating. No seams mar the surface. Production time and steps are cut.





Rectangular copper tube carries current and coolant. By liquid cooling conductors in generator stator bars, General Electric has opened the way to doubling generator ratings without appreciably increasing frame size. Tubes, approximately 0.300″ x 0.130″ O.D., shown in cross section above, are shipped in long coils. Special-shape tubes are available in a wide variety of sizes, cross sections, and alloys.



High-precision tubes meter fluids. York Corp., subsidiary of Borg-Warner, has found restrictor-tube metering of refrigerant in packaged air-conditioning units up to 25-ton capacity has greatly reduced field service, made possible the 5-year protection plan on all units. Anaconda Copper Restrictor Tubes have consistently met York's strict requirements. These tubes are available in copper or aluminum in nominal I. D.'s from .025″ to .090″.

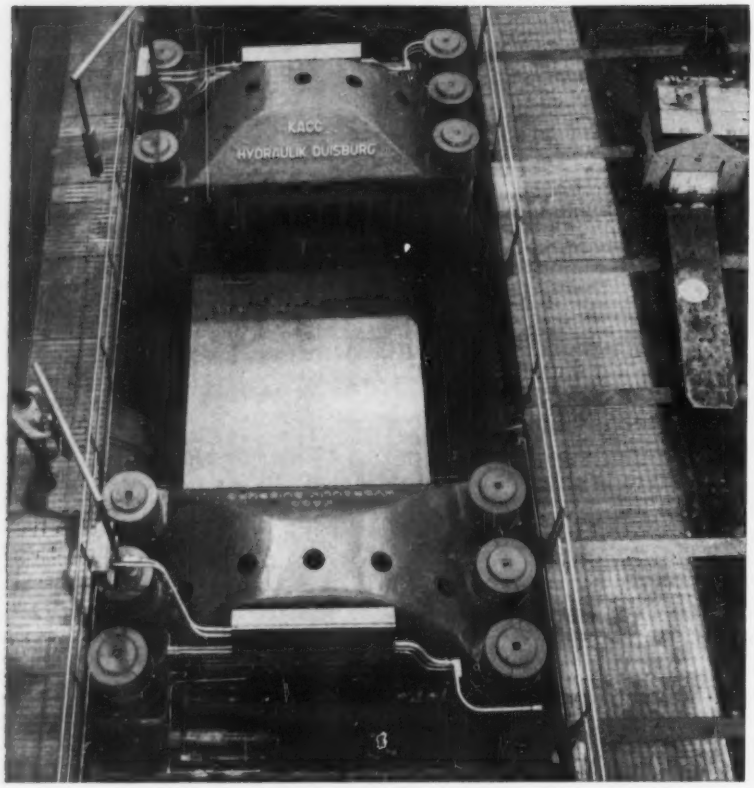
WHETHER you need long lengths of copper capillary tubing for air, hydraulic, or lubricating lines or for instrument tubing—or large-diameter tube in copper or a copper alloy, call your American Brass Company representative. He can help you select the product you need from the broadest range of seamless tubes available to industry. Or write: The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario. 5943

ANACONDA®

SEAMLESS COPPER TUBE

CAPILLARY TUBE • SPECIAL SHAPED TUBE

Made by The American Brass Company



Kaiser's stretcher points up industry's aggressiveness as . . .

Aluminum Eyes Plate Market

TWO PET MARKETING theories of the aluminum industry are embodied in the multimillion dollar plate stretcher just installed by Kaiser Aluminum & Chemical Corp. at its Ravenswood, W. Va., Works. They are:

1. Develop bigger and better aluminum products through the design of equipment to fabricate the metal.

2. Develop the product, promote its use and develop the market.

• **Followed the Formula** — Kaiser had these points in mind when it decided to install the massive unit which can grip the ends of a 60 ft plate of thick, high strength aluminum and stretch its length as much as 4 ft.

The stretcher, said to be nearly twice the size of its closest competitor, has a pulling force of 30 million lb. It can handle alloy plates in thicknesses ranging from 0.5 to 6 in., and in widths up to 13.3 ft. It can take an over-all cross sectional area of 640 sq in. compared with what is said to be the previous industry maximum (about 350 sq in.).

The unit is installed in a concrete pit, 120 ft long, 32 ft wide and 15 ft deep. Only advanced construction designs, says Kaiser, are responsible for holding the stretcher's weight at under 3 million lb since some of its components are extremely large. For example, each half of a cast steel head weighs 264,000 lb and each of two solid columns weighs 145,000 lb.

• **What It Does**—The plate stretcher's job is to refine the internal structure of the metal by equalizing stress distribution in heat treated and welding alloys. The customer benefits because stretched plates offer better flatness and machinability, explains Marvin Lee, Kaiser's marketing manager for sheets and plates.

Kaiser's new stretcher differs mainly from other units in that it produces bigger sizes. That is important to the customer, says Mr. Lee, because the wider the plate he can get, the more he can cut his assembly and welding costs.

• **Market Potential**—Kaiser doesn't expect an immediate return on its investment in the form of a deluge of orders. But it does feel that over the long haul it can sell customers not only on the benefits of larger plates but on the fact that the product is immediately available to them in any quantity they want. On an annual basis, the stretcher can accommodate any volume that can be rolled at Ravenswood.

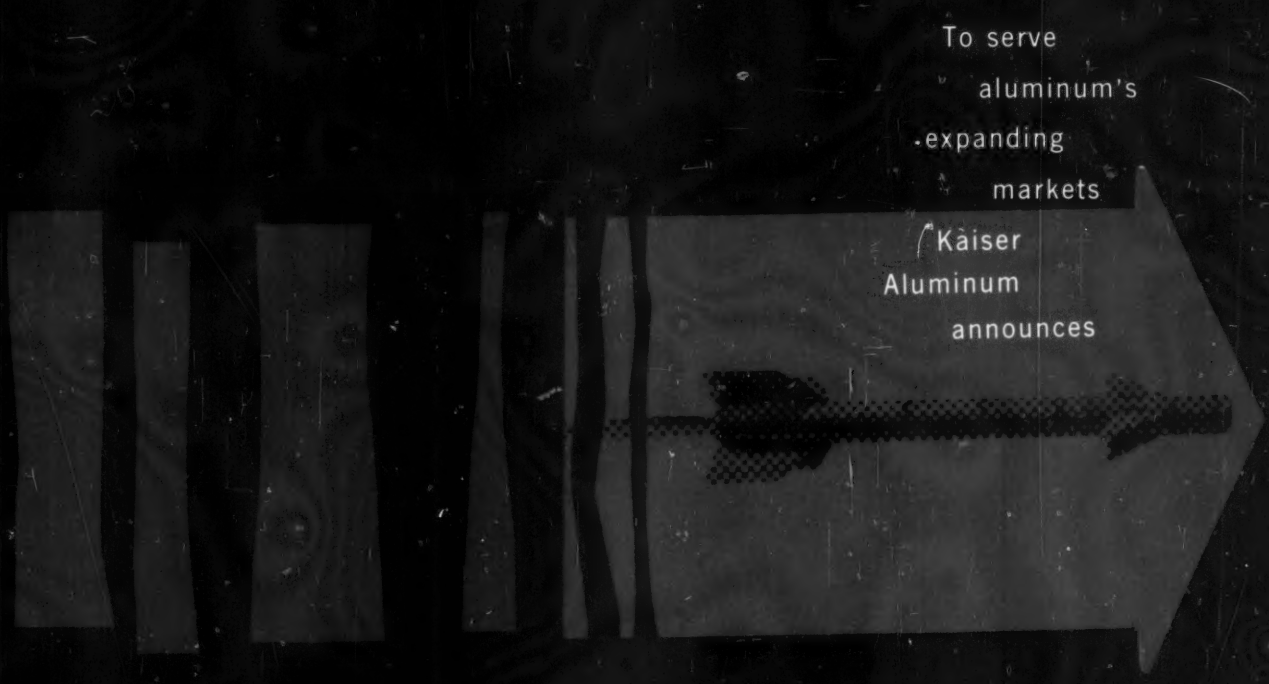
Eventual targets are such fields as cryogenics (processing, storage, and transportation of liquid methane, oxygen, nitrogen, and hydrogen); tanks and process equipment for the chemical processing and petroleum industries; ballistic armor plate for military vehicles; plates for ship construction, railroad gondola and hopper cars. Two other possibilities are in construction and industrial machinery (in applications where aluminum could offer a weight or corrosion advantage).

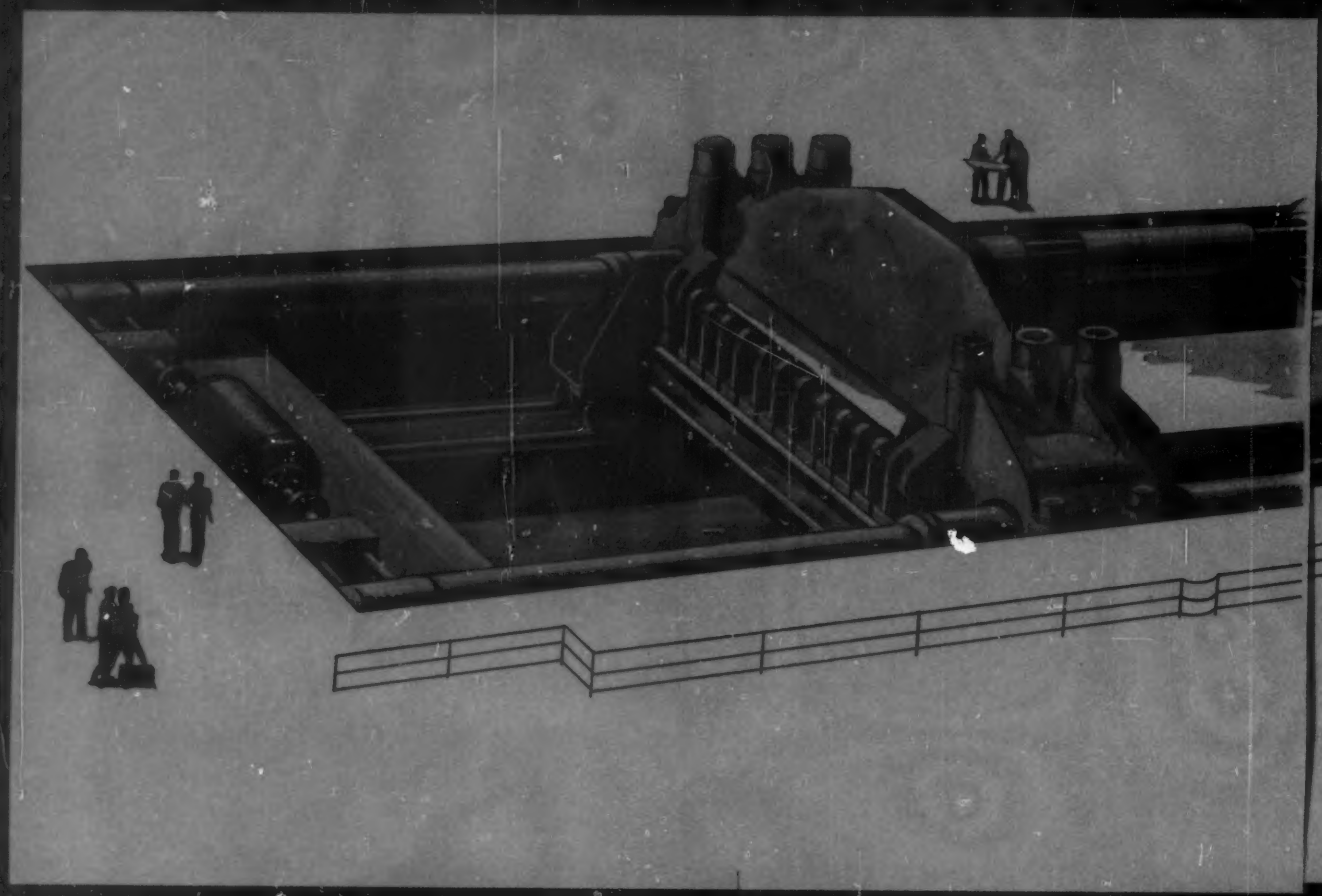
Aluminium to Buy Apex

Aluminium Ltd. plans to acquire the assets of Apex Smelting Co., Chicago, a major U. S. manufacturer of aluminum foundry alloys and extrusion billets. The Canadian company will issue about 340,000 shares on the basis of one and six-tenths shares for each Apex share.

Apex operates secondary smelting plants in Chicago, Cleveland, and Los Angeles where aluminum scrap and primary aluminum are remelted into a number of finished products. Since 1953, Apex has been a distributor of Aluminum Co. of Canada, the major operating subsidiary of Aluminium Ltd.

In addition to aluminum, Apex also produces zinc casting alloys and magnesium alloys and operates a silicon smelting plant in Springfield, Oreg.


To serve
aluminum's
expanding
markets
Kaiser
Aluminum
announces

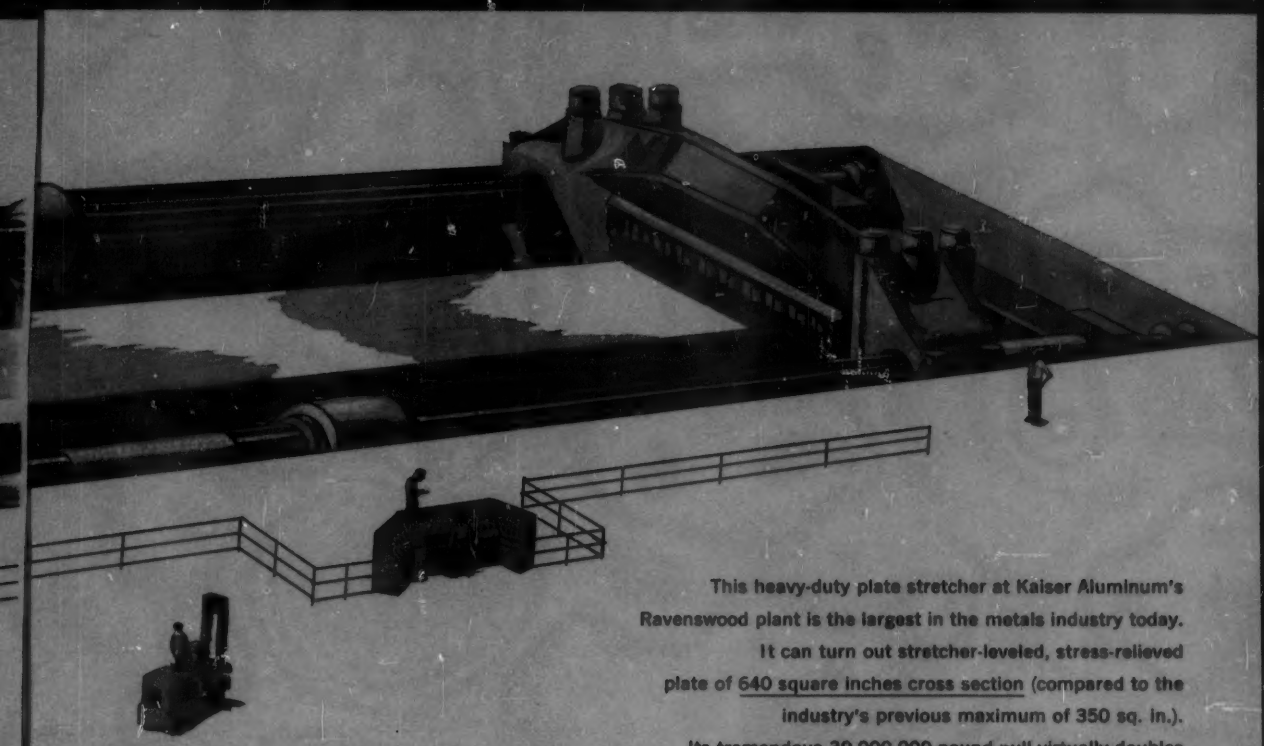


THE LARGEST PLATE STRETCHER IN OPERATION TODAY:

30,000

With the completion of this giant new stretcher at Ravenswood, West Virginia, Kaiser Aluminum supplements its newly-installed rolling facilities to provide heavy plate in specifications beyond any previously available. These new availabilities, added to those already provided by the company's 10,000,000-lb. stretcher at Trentwood, Washington, now offer aluminum users the widest range of stretcher-leveled and stress-relieved sheet and plate in the industry.

Just as the Trentwood stretcher opened up new possibilities for heavy plate when first installed, the new Ravenswood stretcher promises to pioneer still further developments in heavy plate application. Greater plate sizes open up



This heavy-duty plate stretcher at Kaiser Aluminum's Ravenswood plant is the largest in the metals industry today. It can turn out stretcher-leveled, stress-relieved plate of 640 square inches cross section (compared to the industry's previous maximum of 350 sq. in.). Its tremendous 30,000,000-pound pull virtually doubles any previously-existing capacity.

0,000

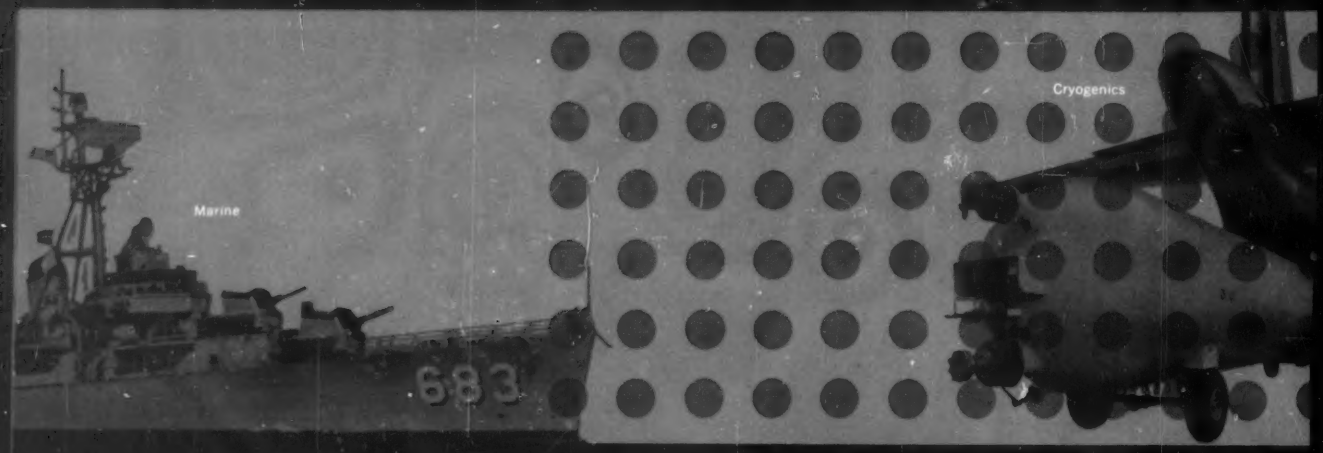
POUNDS PULL

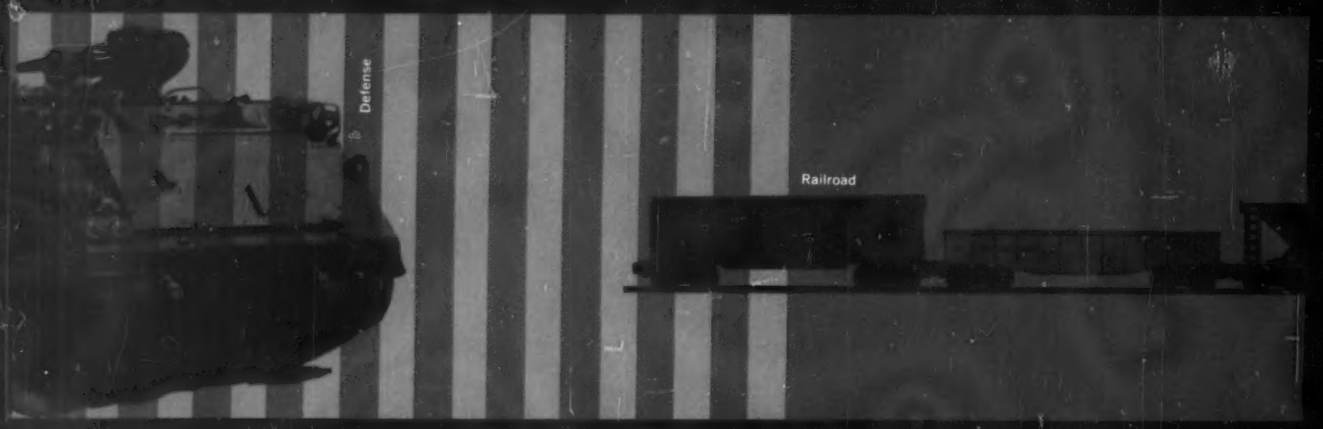
Maximum Plate Dimensions:
160 inches wide
60 feet long
6 inches thick

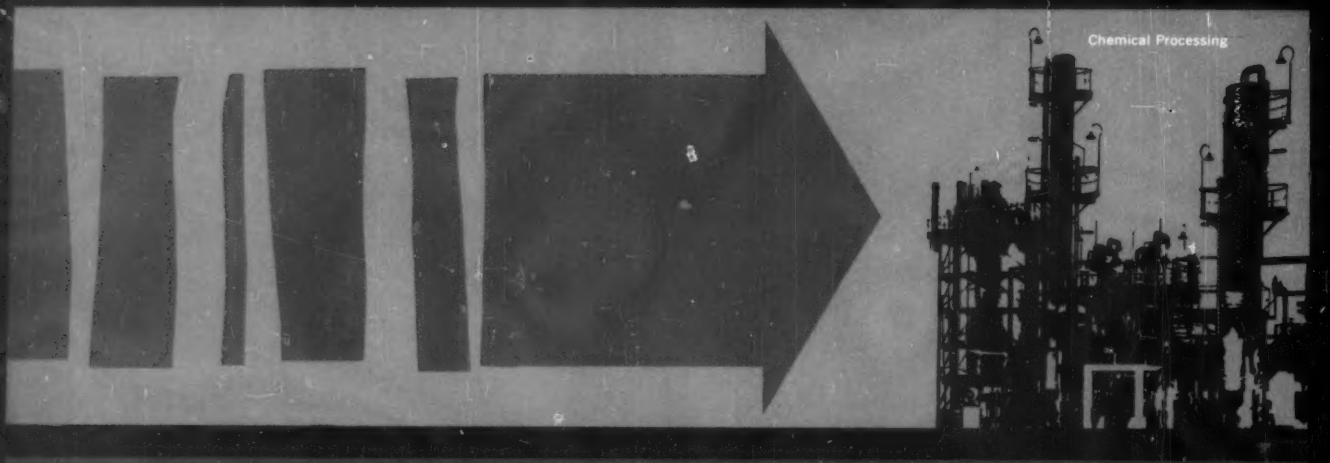
640 SQUARE INCHES
CROSS SECTION

provocative new design potentials . . . permit elimination of fabricating operations with resulting lower costs.

For some of the fields served by these new developments, please turn the page.







KAISER ALUMINUM'S GIANT NEW PLATE STRETCHER IS READY NOW TO SERVE THESE MARKETS...

—as shown on this page. Its extra-wide, 160-inch jaws make possible new fabricating economies for hundreds of industrial applications for stretcher-leveled sheet and plate, and for aircraft applications of stress-relieved sheet and plate. A special technical staff is available to provide on-the-spot consultation in design and application of the new heavy-plate availabilities.

Get the fascinating story of the unique design and operation of this mammoth stretcher, plus full information on how Ravenswood can serve you. Call the Kaiser Aluminum Sales Office listed in your telephone directory . . . or write for the detailed new brochure, "30,000,000-pound Plate Stretcher."

TYPICAL HEAVY PLATE APPLICATIONS

- Trailers
- Amphibious Carriers
- Radio and Radio-Telescope Panels
- Armor Plate
- Bridges
- Structural Components
- Tooling Plate
- Landing Mats
- Aircraft Components
- Cryogenic Equipment
- Storage Tanks
- Over-The-Road Tankers
- Chemical and Petro-Chemical Plants

KAISER ALUMINUM

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TRADEMARK OF KAISER ALUMINUM & CHEMICAL CORP.

How to Develop Your Creative Talent

GAS from the steel industry's coke ovens was once a waste and nuisance, but it now has thousands of profitable chemical uses.

CORNING Glass Works developed strong glass for railroad lanterns and in so doing hit upon Pyrex and other tough glass products which today enjoy markets many, many times the size of the potential for railroad lanterns.

GENERAL Electric Co.'s highly regarded industrial relations policy has been called "daring" and "radical" by its admirers, but it is really the adaptation of conventional marketing methods to labor problems.

Those are only three among countless examples of industrial creativity. Ideas are what American industry is made of. Let them wither and industry will perish. Many a U. S. company has died because it lost the creative force. How to keep that power alive?

GE, General Motors Corp., and Eastman Kodak Co. are a few of the hundreds active in the search for ways to enhance creativity. A. L. Simberg, supervisor for personnel research and development at GM's AC Spark Plug Div., defines creativity this way: "Combining old and/or new ideas (with some distortion) to form a new combination which will better satisfy a need."

Creative talent perhaps cannot be enlarged, but it can be used more productively, says Alex F. Osborn, co-founder of the advertising agency, Batten, Barton, Durstine & Osborn. He also agrees with most psychologists that "everyone is gifted with creative potential." He adds: "The student can be trained to use more productively the talent which he innately possesses. This training is subject to disciplines similar to those applicable to the mastery of any subject."

Industry can encourage creativity by hiring the right people, providing them with the right supervision in the right company climate.

The Right People

A creative person is emotionally free, uninhibited, willing to share ideas, verbally expressive, often bored with people, fluent with ideas, positive in temperament, a good listener as long as the talk relates to his own work, not particularly orderly in behavior but systematic in thought, often antisocial, highly reactive, impatient with people but persistent with ideas, impulsive, willing to take chances, fidgety, generally above average in intelligence (but not always), fairly independent, usually artistic, perpetually dissatisfied.

Those specifications were compiled by Richard Renck and Drs. George O. and Melany E. Baehr of the University of Chicago's Industrial Relations Center. They're concerned with developing tests to measure creativity in industry. The university thinks so well of an AC Spark Plug test that it is publishing it.

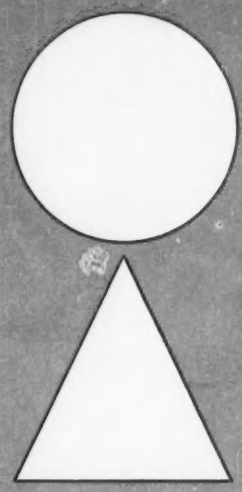
Typical questions include variations of that shown at the right. A creative person will take the simple shapes and use them many times in varying sizes to form abstractions, designs, stylized figures. A person with underdeveloped creative powers will tend to use only one circle and one triangle in a limited number of juxtapositions.

Another common test question presents problems and asks for as many suggested solutions as possible. Examples: What can you do with 100 bricks? What can you do with a wire coat hanger? The person who suggests grinding the bricks and using the dust to color and fortify concrete is considered more creative than the one who recommends building a wall. Using a coat hanger to hold Christmas decorations is thought more creative than making a probe with it to clean out drains.

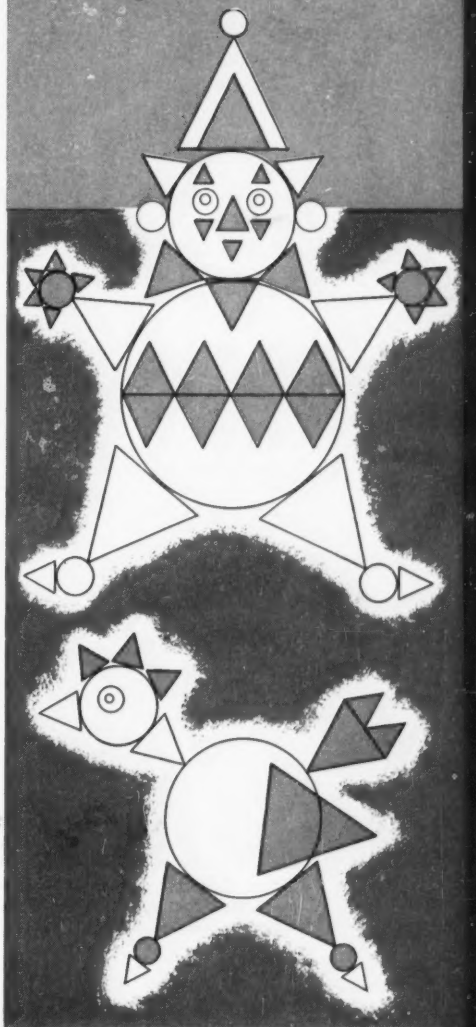
AC Spark Plug has given its test

(*Please turn to Page* 56)

Questions to test creativity ask for new designs from this . . .



Get shapes like this . . .



integrated CRUCIBLE steel service

Local Crucible personnel provide service in depth, ranging from quick reports on steels available to expert assistance with metal working problems.

Average warehouse staff is backed up by Crucible Metallurgists who, although located at mills, will travel.

maintains broad range of local customer services

—*ranges from in-stock deliveries to metallurgical research*

Here's *service in depth*, made possible by Crucible's integrated operation. It starts with in-stock deliveries of the steels you need and goes on to provide complete technical assistance for engineers, production, toolroom and maintenance men. And the entire service is available from all of Crucible's 32 warehouses —

(1) *Deliveries from local stocks* of 16,000 specialty steel items, including all grades, shapes and sizes.

(2) *Basic specialty steel data* — complete breakdowns on properties, characteristics, as well as machining and fabrication details. (Warehouse account salesmen can frequently recommend the best steel for the end use.)

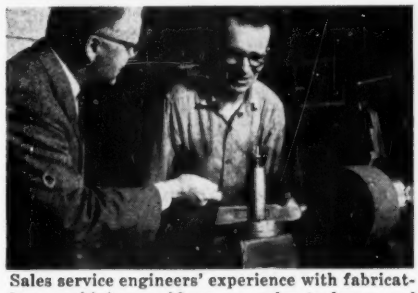
(3) *Metalworking assistance* with unusual machining and fabricating problems — by trained, experienced sales-service engineers who specialize in tool steels, stainless, alloys.

(4) *Metallurgical research* — help in developing steels for tomorrow's more exacting applications from Crucible's metallurgists, who will come to your plant on call.

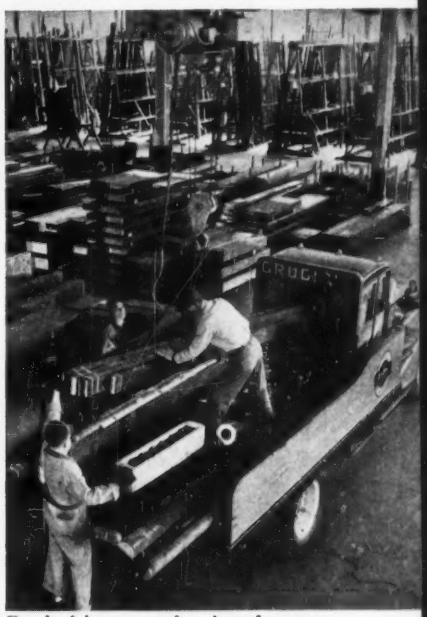
Here's what one purchasing agent recently had to say about this over-all service: "We need lots of help with new steels — ones we haven't used before. The reason we rely on Crucible warehouses is because their men know the answers — or can get them for us quickly."

Why not simplify your own specialty steel purchasing problems by taking advantage of this integrated service? *Crucible Steel Company of America, Dept. PL-15, Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

Crucible metallurgists will come to your plant, if necessary, to help engineers use new steels or metals like titanium.



Sales service engineers' experience with fabricating, machining problems can solve toolroom and production problems.



Truck drivers speed orders for overnight delivery to you — or earlier if your order is an "emergency."

Teletype operators get direct reports on quantities available everywhere in the warehouse system — from Crucible's inventory-control computer room.

STOCK LIST

Keeps you up-to-date on local stocks of specialty steels. Just ask the Crucible salesman to place your name on the regular mailing list.

One Source For All These Steels

TOOL STEELS – Water, oil, air hardening, shock resisting, hot work, plastic and die casting steels in all forms, including bars, sheets, plates, drill rod, hollow bars, forgings and flat ground stocks

HIGH SPEED STEELS – Crucible's famous "Rex"® steels; Rex Thrift Finish rounds, hot rolled and cold drawn flats and squares, drill rod, forgings, sheets, plates, and tool bits

STAINLESS STEELS – Bars, sheet, strip, wire, cold heading wire, metalizing wire, plates, angles

FREE MACHINING STEELS – Crucible Max-el® rounds, hexagons, plates and brake die steel

ALLOY STEELS – Bars, billets, strip and sheet

COLD ROLLED CARBON SPRING STEELS

DRILL STEELS – Hollow and solid drill steels

ALUMINUM EXTRUSION DIE STEELS

HOLLOW TOOL STEEL

HARD FACING ROD

PLASTIC MOLD STEELS

PERMANENT MAGNETS

— and many others

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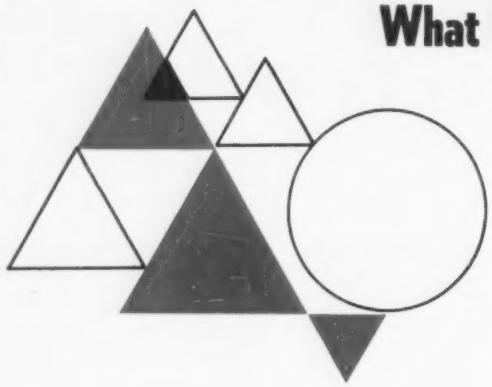


What Motivates the Creative Man?

(105 authorities rank the seven top factors)

1. He wants to solve problems.
2. He craves personal gratification.
3. He seeks prestige.
4. He needs more money.
5. He wishes an advance in title.
6. He has a strong competitive instinct.
7. He desires fringes (like bonuses).

Adapted from survey by Deutsch & Shea Inc., manpower consultant, New York.

(*Continued from Page* 53)
to all engineering and manufacturing personnel, and newly hired people in those areas are now being tested. Mr. Simberg concludes: "Numerous validation studies have verified that our test does measure a person's creativity and that it is possible to use the test as one basis for selecting such individuals."

GE uses tests, intensive interviews, and problem-solving situations to find creative people. "Our process is effective," says A. A. Root, consultant on technical education development at GE, "but we're convinced that it can be improved."

F. G. Tatnall of Budd Co.'s subsidiary, Tatnall Measuring Systems Co. at Phoenixville, Pa., is not so confident that tests are effective in measuring truly creative people. You can recognize them by a simple test, he believes. "They particularly dislike the comptroller." On a more serious note, he adds: "Keep the creative thinker separated from distractions, especially people who irk him, because he is a nonconformist."

Messrs. Tatnall, Root, and Simberg agree that distractions stifle creativity. Mr. Simberg thinks the greatest block to creativity is the "lack of realization on the part of all individuals that they are capable of truly productive, creative effort." If we realize that we all have the ability to some extent, "we have jumped the first hurdle."

AC Spark Plug finds that creativity is spurred by merely focusing attention on it through company policy.

But blocks to creativity that the individual himself can overcome keep cropping up. While there is no simple solution, experts advise that three steps can help a man with his own problems:

1. Recognize that everyone is prone to blocks.
2. Admit it when you have one.
3. Work on those blocks you admit and recognize by trying new situations, working in a different place or at a different time, closeting yourself from distractions.

The Right Supervision

Sometimes the creative individual is unable to overcome blocks by himself. That's where the importance of good supervision lies. Deutsch & Shea Inc., New York manpower consultant, solicited the views of 105 authorities on creativity. They came up with this paragon as the ideal supervisor for creative people:

"He's a sympathetic, friendly person who likes both people and ideas. He is able to relate cooperatively and stimulatingly with his subordinates. He is a pleasant, easy-to-get-along-with personality who has hi tandards of personal integrity. of his most significant attribu is his ability to be patient and rant and extremely flexible both in thinking and acting. For him nothing should be frozen, stable, static, or permanent. Unlike his noncreative colleagues who build up a comfortable system or channel in which to operate and into which their sense of stability can easily flow and solidify, the creative supervisor has no need for the doctrinal mode of thinking. He feels rather that he can take nothing for granted and that the volatile, evolving, and unconfined reaches of technological advances have not been tapped."

Probably no one man can meet that description or match all the attributes in the accompanying checklist; but the goals are well worth shooting for.

Especially important for the supervisor to know is what motivates the creative man (see the accompanying list). Note that money is fourth on the list. The passion to solve problems is far and away the creative man's strongest motivation.

Drs. Baehr urge that the supervisor recognize this to improve the supervisory technique. They advise:

1. Genuinely delegate.
2. Give goals, but not methods.
3. Give recognition to creative persons through title, status, and money without burdening them with administrative duties.
4. Be the champions of creative people with top management.
5. Supervise firmly but not too closely.

Profile of the 'Ideal' Supervisor for Creative Men

The supervisor should . . .

be creative.

have insight into the creative process.

understand creative temperaments.

have high technical competence in his field.

inspire and encourage.

safeguard areas of freedom.

bolster self-confidence.

respect others' ideas.

be a tactful critic.

give credit fairly.

be skilled in assigning responsibility.

control "lightly."

be skilled in communications.

Adapted from survey by Deutsch & Shea Inc., manpower consultant, New York.

The supervisor's main job in dealing with creative people is to encourage and stimulate. Discouragement is common when dealing with the unknown, points out Mr. Osborn, and discouragement itself is a bad block to creativity.

The Right Climate

The supervisors are the key to maintaining the right climate for creativity. But atmosphere must start from the top man or men.

This is said by subordinates of John Collyer, chairman of B. F. Goodrich Co.: "He not only welcomes every possible idea but makes us all feel that what he most wants from us is utmost use of our creative imagination."

Mr. Osborn believes one of industry's most urgent needs is to improve the creative power of second-line executives. They too often limit their creative imagination to thinking up what the boss will do or want next, he says. As a result, the climate fostered by the president or chairman is partly soured by the officials under him.

The right climate is freedom—freedom to err, freedom to choose projects (within limits), freedom to experiment, freedom from distractions.

Also important is that this right climate be everywhere in the company—not just in engineering and research, which are usually considered the "creative" parts of an organization.

"Every part of a company can be creative, even the mailroom," says an automotive supplier. "We particularly need creative selling to deal with new marketing problems, creative accounting to figure our costs more accurately and quickly, and creative traffic management to cope with our increasingly complex delivery and shipping problems."

Other experts agree that you can't be free with only a few departments. The lack of freedom in some will gradually infect the others. "There's no such thing as a half pregnant woman, just as there's no such thing as half freedom," says one company president.

The physical aspects of environment are important too. Authorities are nearly unanimous in recommending technicians and aides for creative people. They also advise modern equipment and other facilities, good reference materials, and company libraries. They don't think private offices or labs are always necessary. Most would vote against the isolation of creative people.

No unanimity can be found on the merits of brainstorming and other group methods to spur creativity. Advocates say:

- A group's efforts are more effective than the sum of individuals'.
- Teamwork provides cross fertilization of ideas.
- Groups do not have the fear of criticism when working in a group.
- Teamwork has led to many of our modern inventions and discoveries.

Critics of brainstorming say:

- Real creativity is individual creativity. The truly creative person is a lone wolf and does not work at his best in a group.
- Teamwork suffers from the pull of the lowest common denominator.
- Collaborative projects have increased the suppression of individual initiative, courage, and independence.

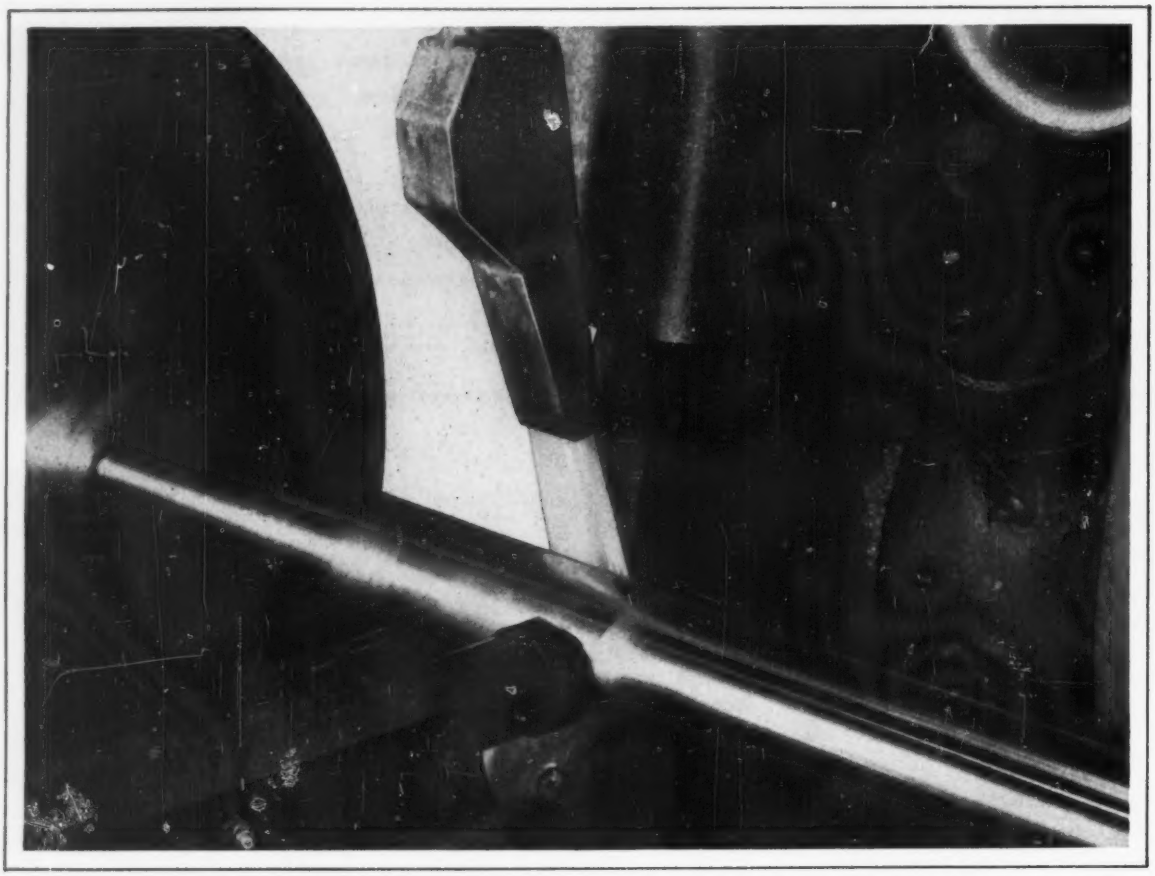
The "Rights" to Creativity

While creativity can be improved, most psychologists agree, some fear that the pursuit of it will become an industrial fad. "Creativity is not a technique like marketing," they caution.

The three "rights" cannot guarantee creative vigor. They can only help sustain it. The source of creativity is as mysterious as that of life itself—and just as fragile. Handle with care.

• *An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.*

US RUBBER GRINDING WHEELS



"U.S." Grinding Wheels installed on Naxos-Union roll grinder.

"We're standardizing on 'U.S.' GRINDING WHEELS"

—Mr. Alex Munroe, Revere Copper & Brass, Inc.

After Alex Munroe of Revere's Baltimore plant installed "U.S." Grinding Wheels on their Naxos-Union roll grinders (for reconditioning rolls on their Sendzimir 51" rolling mill) several things were immediately apparent. Chatter was eliminated and stock removal was clean and efficient. Grinding time was cut approximately 30% while producing a regular finish.

That's why Revere is standardizing on "U.S." Grinding Wheels, not only on roll grinders but for reconditioning large back-up rolls. In fact, wherever "U.S." Wheels are used, performance reports have been excellent.

If you, as a manufacturer, want to reduce grinding wheel costs and increase production, "U.S." has what it takes. For "U.S." Wheels consistently outperform and reduce costs in case after case. Get in touch with your "U.S." Representative today or write or call the address below.

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Mechanical Goods Division

United States Rubber

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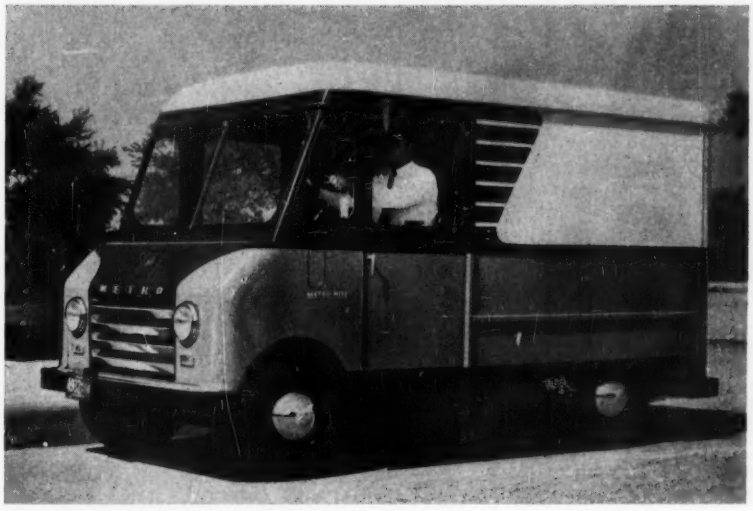
Motordom Readies Truck 'Compacts'

SMALL TRUCKS in the 3000 to 4000 lb gross vehicle weight category will be Detroit's next effort in the compact transportation field. Ford is expected to have its version ready before 1961. As with smaller cars, the success of imports made motordom aware of the market.

As suburbia spreads out, multistop delivery and service vehicles are finding more uses and more buyers. Salesmen use them for traveling offices. Commuting neighbors band together to buy a small bus. Utility companies turn them into combination delivery, repair, and service centers.

Domestic producers have long offered station wagons and panel trucks for those purposes, but designs are limited in capacity, or are awkward to load and unload. Operating costs and initial prices are high.



International Harvester's Metro-Mite

Imports Started the Trend . . .

Sales of Light Trucks

Imports

1960	50,000
1959	35,000
1958	20,000

Volkswagen Van

• **Enter Volkswagen** — In 1956, Volkswagen introduced a sampling of its van type trucks to the American market and demonstrated how versatile and economical its side loading carry-all could be. So far, some 20 per cent of VW's truck sales have been for fleet use. One customer figures that over 23,000 miles his VW fleet costs him about 9.7 cents a mile to operate and maintain vs. the 22 cents per mile he was paying for his fleet of domestically built, half ton trucks.

Other importers joined in. A dozen or more firms are now unloading small trucks at East and West Coast ports. Among the better known models are Renault, Volvo, Daimler-Benz, and Ford's English built Thames. Their chief advantages: Step-in entry and egress, adequate payloads (1800 lb is average), and low operating costs. Prices start slightly below those of the least expensive U. S. built vehicles. Volkswagen lists at $1845 (p.o.e., New York). The Thames sells for $2411.

• **Builders Take Hint**—Truckmakers have been quick to catch on. International-Harvester Co., Chicago, introduced its 3800 lb Metro-Mite, claimed to be the smallest American made multistop truck. Early this year, Divco-Wayne Corp., Detroit, brought out a miniature passenger coach seating 12 to 25 persons. Studebaker-Packard Corp. offers a panel truck conversion for its Lark wagon. Ford plans to introduce a pickup truck body on its Falcon station wagon chassis this spring. Chevrolet is expected to make a similar conversion available. Chrysler Corp. has a full line of Simca trucks it can market.

The efforts don't stop there: Compact trucks are being designed to meet foreign competition for the multistop market. They'll be van type and will be aimed at customers who have bulky rather than heavy loads. Several of them may offer diesel engines.

• **White's Van** — A heavy duty truckbuilder, White Motor Co., Cleveland, has purchased Montpelier Mfg. Co., an Ohio firm specializing in the building of small truck bodies. Although it's reluctant to discuss the project, White intends to introduce a unitized, multistop delivery truck to compete with the Metro-Mite and Volkswagen vans. It probably will ap-

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Are You a Good Guesser?

Check the Servicenter, Page 5, for details of our Beat-the-Experts contest. You might win free use of any Ford Div. car for two weeks, or become the owner of a handsome dream car color print.

pear by mid-1960. It may be that White plans to install a small diesel powerplant in its compact truck. Diesels are ideally suited to such service—engines get a lot of "idle" time during stops along a delivery route.

Chevrolet and Dodge Truck also have compact models under design. The Dodge is apparently part of a compact vehicle family being designed by various Chrysler Corp. groups. It probably won't be on the market until late 1961. Chevy's truck reportedly is of the unitized van design. It's supposed to utilize Corvair's basic underbody structure, possibly Corvair's rear engine. Curb weight on the Chevrolet compact truck is supposed to be around 2600 lb. STEEL's sources say it will be able to handle 1900 lb payloads. Introduction seems to be trending toward late 1961.

• **Ford's Fastest**—Reportedly called Econoline, Ford's compact truck appears to be closest to production of any of the Big Three models. Design engineering is about finished, and tooling should be released early in the spring, say informants. Normally, this would mean the truck would be ready for the 1962 model season, but Ford reportedly is attempting a crash program to bring it out in late 1960 or early '61. If true, look for tooling releases to start momentarily.

The Ford version will be a unitized, forward control body style and will come in van and bus models. The van will have two rear sideload doors on the right hand side only. The bus has windows in the doors. Reports are that the truck is 165 in. long, 74 in. wide, and 76 in. high. It has a 90 in. wheelbase. All attachment points for chassis components are embossed (stamped) into the body sheet metal substructure.

Falcon's 144 cu in. displacement engine is supposed to power the Econoline trucks. Ford may increase the displacement by lengthening the stroke half an inch. Gross vehicle weight is reported at 4100 lb maximum. Payload is around 1700 lb.

New Speed Control Device

ACon-O-Cruise is the name of the vacuum operated speed control device being marketed by GM's AC Spark Plug Div., Flint, Mich. It will be offered to all car producers as a manufacturer's installed option.

The control is operated by vacuum from the engine manifold so no springs or electric motors are needed, explains Joseph A. Anderson, general manager. "This means it is less expensive to manufacture, easier and quicker to install, and more dependable in service," he adds. The vacuum operation makes it easier to override the control if extra speed is needed for passing. The car automatically returns to the preset speed.

A governor attached to the car's speedometer cable acts as the sensing unit. Speeds can be controlled down to 30 mph, which make the unit practical for suburban driving in closely controlled speed zones. To set the device, the driver presets a speed indicator. When the preselected speed is reached, back pressure against the accelerator acts as a silent signal to tell the driver to push a button that brings the cruise control into operation to maintain that speed. Touching the brake pedal disengages the system. It also cuts out automatically at dangerously high speeds, or if any component in the system should fail.

Exhaust Notes

• Ford Motor Credit Co. has opened its first finance office in Indianapolis. It offers wholesale and retail financing services to Ford company dealers but does not directly finance retail buyers. The parent Ford company is forming an insurance subsidiary to operate in conjunction with the credit firm.

• GM's Ternstedt Div. will build a divisional central office and engineering center next to the General Motors Technical Center, Warren, Mich. The 500,000 sq ft facility will be ready for use in the spring of 1962. Some 1100 employees will be transferred from other divisional offices. Another 600 will be hired to complete the staff. Ternstedt operates plants in Detroit, Columbus, Ohio, Trenton, N. J., and Flint, Mich. It manufactures 1500 trim and hardware items for some 400 parts in GM automobiles.

• Buick Div. reports it has cut the sound pressure level inside its 1960 cars by 50 per cent through the use of five insulating materials, each designed to eliminate a specific noise. The materials are Amberlite, felt, jute, Fiberglas, and spray-on deadener. Buick's the only carbuilder that maintains a full time acoustical engineering staff. Electronic equipment is used to isolate noise sources.

U. S. Auto Output

	Passenger Only 1959	1958
January	545,757	489,515
February	478,484	392,132
March	576,085	357,048
April	578,825	316,594
May	546,817	349,613
June	557,994	337,446
July	555,418	321,017
August	239,152	180,447
September	258,157	130,460
October	507,530	261,701
November	254,518	514,152
11 Mo. Totals	5,098,737	3,650,125
December		593,920
Total		4,244,045

Week Ended	1959	1958
Nov. 21	68,476	138,727
Nov. 28	46,740	123,008
Dec. 5	55,337	147,361
Dec. 12	86,056	137,882
Dec. 19	149,707†	135,964
Dec. 26	105,000*	104,907

Source: *Ward's Automotive Reports.* †Preliminary. *Estimated by STEEL.

If you use locating dowels, hinge pins, rivets, set screws . . . or straight, knurled, tapered or cotter-type pins—you should look into the savings in time and money offered by the Rollpin formula. **(1)** You start with a straight production-drilled hole—no threading, peening or precision drilling is needed. (For example: permissible and typical hole tolerances for effective Rollpin installation are .125-.129 for the ⅛" diameter pin; .250-.256 for the ¼" pin.) **(2)** You need no more than a hammer . . . simply modified hand tooling, arbor press or hydraulic press to set the Rollpin into a secure, vibration-proof fit. **(3)** You just drive the Rollpin into the hole . . . and that's it. Spring action locks the Rollpin in place . . . regardless of impact loading, stress reversals or severe vibration. Yet it is easily drifted out . . . and can be reused in the same hole. For information on how Rollpin can simplify your fastening jobs, fill in and mail coupon below.

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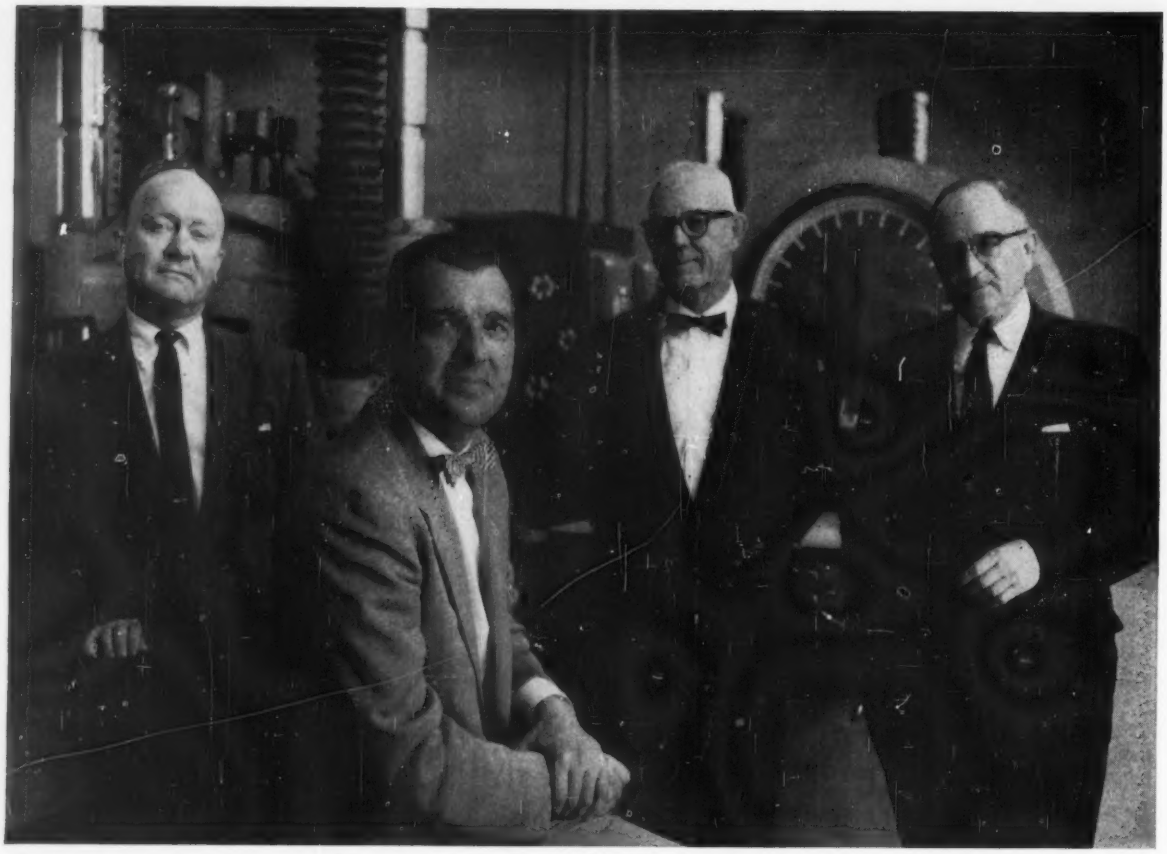


Protecting product quality is the responsibility of Lukens' Metallurgical Division. Four members of this expanded control team are, left to right: Sam Lemmon, Metallurgical Service; Lou Mandich, Manager; Howard Turner, Inspection; and Joe Althouse, Chief Metallurgical Engineer.

LUKENS STRENGTHENS THE GUARD ON QUALITY

To the steel buyer, Lukens' new ranking as a steel plate producer means more than increased tonnage. It promises complete confidence in buying decisions. For, together with the expansion of its steel making facilities, Lukens has strengthened its control over plate quality at every step—from open hearth to customer's shop.

The men assembled above in Lukens' new Physical Testing Laboratory spearhead this increased control. Working with the industry's broadest range of plate materials—from ordinary carbon steel to ultrasonically tested hullplate for nuclear submarines—these experts represent the emphasis Lukens places on dependable plate quality.

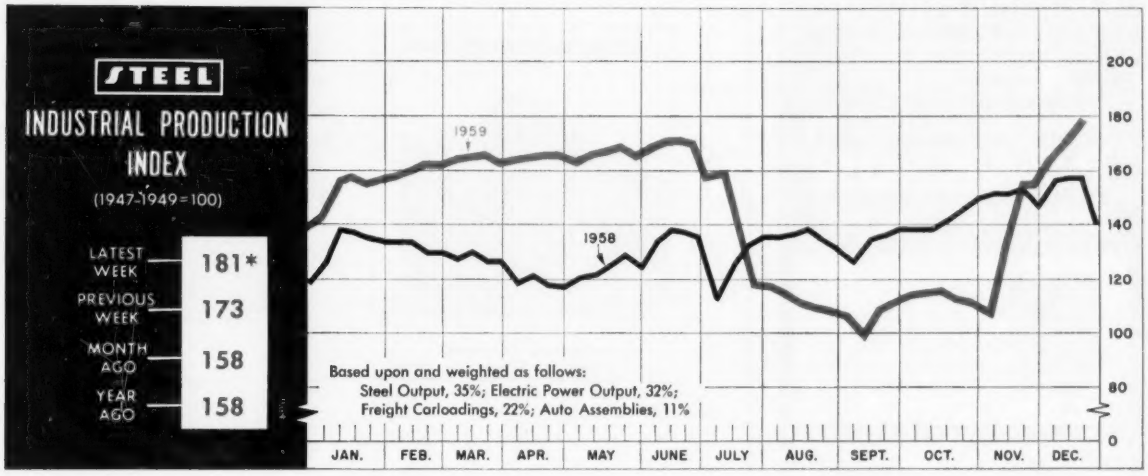
Now consolidated into one closely working team are these vital functions: Inspection, Plant Metallurgy, Metallurgical Development, Quality Control and Metallurgical Service. Under Lou Mandich's direction, and together with Lukens' other operating and marketing groups, they are successfully pursuing the overall aim of our expansion program: *capacity and quality levels to meet the growing needs of our plate fabricating customers.*

Lukens Steel Company, Coatesville, Pa.

NEW CAPACITY ~ NEW QUALITY

LUKENS ®

SERVING INDUSTRY WITH A WIDE RANGE OF SPECIALTY CARBON, ALLOY, ARMOR AND CLAD STEEL PLATE • HEADS • PLATE SHAPES • PLATE-MATE WELDING ELECTRODES AND WIRE



*Week ended Dec. 19.

Year Ends on Record High Level

THIS YEAR is ending just as it started out—on a strong uptrend. It can be seen in STEEL's industrial production index, which zoomed 8 points in the week ended Dec. 19 to a preliminary 18 per cent of the 1947-49 average. This set the all-time high for the index, and it may be some time before that mark is erased.

• **Here's Why**—Of the three factors which have powered the trend line up that steep incline—steel output, auto and truck assemblies, and electricity production—at least one (electricity production) is sure to take a postholiday dip. Not much additional strength can be expected from steel production, although it will remain at the unusually high rate of the last couple of weeks through most, if not all, of the first half. Auto and truck output is being pushed almost to the limit to make up for lost time during the steel shortage. But even if schedules go as high as they did during the peak operations of late 1956, the addition to the index will still be only 3 points. Freight carloadings will remain strong, but a seasonal downtrend is in the offing.

Result: STEEL's index (which is not seasonally adjusted) will probably fluctuate between 170 and 180 during the first quarter, climbing past 180 in April or May.

• **Third Best Average**—The year-end rush resulted in an average index of 149 for 1959, which places it behind the record 153 in 1957 and 151 in runner-up 1956. Considering the depressed state of the trend line during all of the third quarter and most of the fourth, this still must be considered in many respects the best all-round year on record.

Casting Shipments Climb

Foundrymen, who were among the first to feel the recession and among the last to experience the recovery, are looking forward to one

BAROMETERS OF BUSINESS	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1,000 net tons)[2]	2,647[1]	2,726	1,840
Electric Power Distributed (million kw-hr)	14,300[1]	14,167	13,534
Bituminous Coal Output (1,000 tons)	9,120[1]	9,050	9,433
Crude Oil Production (daily avg—1,000 bbl)	7,100[1]	7,123	7,097
Construction Volume (*ENR*—millions)	$313.8	$293.7	$291.8
Auto, Truck Output, U. S., Canada (*Ward's*)	178,092[1]	103,645	168,406
TRADE			
Freight Carloadings (1,000 Cars)	625[1]	642	571
Business Failures (Dun & Bradstreet)	248	261	267
Currency in Circulation (millions)[3]	$32,798	$32,601	$32,394
Dept. Store Sales (changes from year ago)[3]	+2%	+2%	+3%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$28,395	$24,745	$25,589
Federal Gross Debt (billions)	$292.2	$292.4	$282.8
Bond Volume, NYSE (millions)	$33.4	$36.2	$34.9
Stocks Sales, NYSE (thousands of shares)	16,094	17,001	18,656
Loans and Investments (billions)[4]	$105.5	$105.7	$95.0
U. S. Govt. Obligations Held (billions)[4]	$28.0	$28.2	$31.9
PRICES			
STEEL's Finished Steel Price Index[5]	247.82	247.82	247.82
STEEL's Nonferrous Metal Price Index[6]	228.5	231.2	217.3
All Commodities[7]	119.0[1]	119.0	119.1
Commodities Other than Farm & Foods[7]	128.6[1]	128.6	127.1

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1959, 2,831,486; 1958, 2,699,173. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-39=100. [6]1936-39=100. [7]Bureau of Labor Statistics Index, 1947-49=100.

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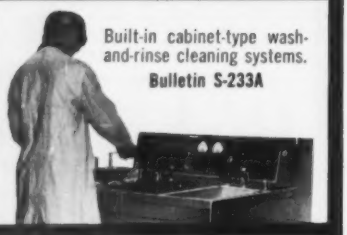
Bulletin S-509, S-217B



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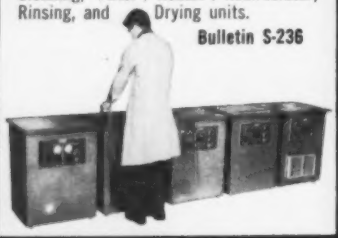
Bulletin S-233A

Modular cabinet-type systems with Cleaning, Filter / Heater / Recirculator, Rinsing, and Drying units.
Bulletin S-236



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Bulletin S-235

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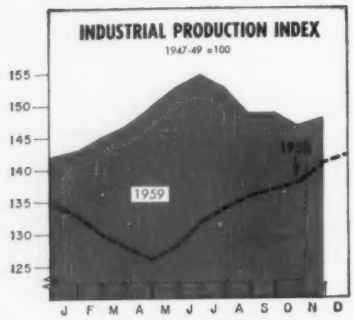
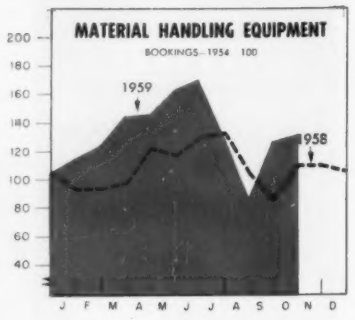
THE BUSINESS TREND





(Seasonally adjusted)

	Total Production		Primary Metals		Metal Fabricating	
	1959	1958	1959	1958	1959	1958
Jan.	143	133	125	100	166	159
Feb.	145	130	138	95	168	153
Mar.	147	128	146	91	170	150
Apr.	150	126	149	86	173	146
May	153	128	154	91	178	148
June	155	132	150	103	184	151
July	153	134	108	102	186	154
Aug.	149	136	67	109	182	156
Sept.	149	137	65	113	183	155
Oct.	147	138	63	123	181	155
Nov.	148*	141	105*	123	171*	163
Dec.	...	142	...	123	...	165
Avg	...	134	...	105	...	155

Federal Reserve Board. *Preliminary.
Charts copyright, 1959, STEEL.

	1959	1958	1957	1956
Jan.	115.84	93.07	126.34	122.43
Feb.	124.77	93.49	139.29	129.56
Mar.	146.36	97.89	140.76	166.14
Apr.	147.28	122.36	132.67	145.20
May	164.45	118.04	157.95	155.53
June	170.72	131.15	121.57	189.13
July	130.26	134.34	128.31	165.50
Aug.	87.02	104.46	110.09	168.70
Sept.	126.43	85.41	116.79	130.35
Oct.	131.09	111.35	124.80	143.38
Nov.	.....	110.88	87.80	138.50
Dec.	.....	105.97	105.65	117.76
Avg	.....	109.87	124.34	147.68

Material Handling Institute Inc.

of the best years in the industry's history in 1960.

Foundry, sister publication of STEEL, queried 2700 foundries and found that anticipated shipments next year will top this year's by about 10 per cent. Stacked on top of the 25 per cent improvement in 1959 over 1958, this comes to about 17.6 million tons, good enough to make next year the fourth best ever.

Foundry points out that the forecasts were tempered by the uncertain labor outlook for both the steel and railroad industries. If peace reigns, 1960 could be the third best year. The previous shipment peak was 19.3 million tons in 1951. Second best year was 1955 with about 18.8 million tons. Shipments this year were slightly under the 16.5 million tons posted in 1957.

Sixty-five per cent of the respondents look for better production next year, while 30 per cent see no change, and only 5 per cent see a decline. The biggest dose of optimism came from steel founders, who anticipate a 10 to 15 per cent gain. Seventy-five per cent of the correspondents expect an upturn. For the other segments of the industry —gray iron, malleable, and nonferrous—gains of 10 per cent or less were forecast, with 62 to 68 per cent of the respondents expecting to participate in the rise.

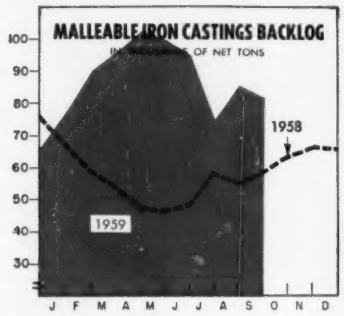
Business in the second half of next year should be better than it was in the first half. About one-fourth predict that, while only 11 per cent see a declining trend after midyear.

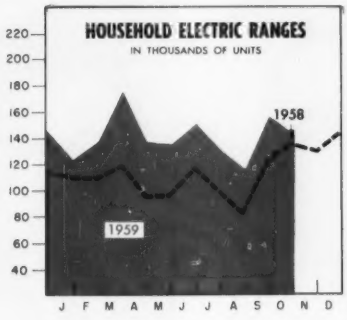
That should be good news to suppliers of equipment because it means more capital improvements. Over half the foundries employing 100 or more expect to make plant additions or improvements, and one-third of the smaller shops will boost such spending. However, only 4 per cent of all those replying will build new plants. The most popular items on the purchasing agenda for 1960: Melting furnaces, sand preparation equipment.

In its yearend forecast for the ferrous casting industry, the Business & Defense Services Administration sees a 15 per cent increase next year for shipments of gray iron and ductile iron, malleable iron, steel, high alloy-stainless, and investment castings.

BDSA Forecasts Increases

Other BDSA forecasts for 1960 which will influence metalworking are:





	Shipments 1959	Shipments 1958	Unfilled Orders* 1959	Unfilled Orders* 1958
Jan.	73.2	62.7	77.3	67.3
Feb.	74.8	54.7	90.3	59.0
Mar.	84.3	51.7	95.8	54.3
Apr.	91.0	50.7	102.5	47.7
May	83.5	48.3	99.9	46.6
June	85.5	51.9	95.3	48.3
July	69.2	41.9	75.3	58.3
Aug.	65.1	49.3	85.9	55.1
Sept.	76.1	56.8	82.3	58.4
Oct.	...	61.0	...	63.4
Nov.	...	63.4	...	66.7
Dec.	...	68.4	...	65.9
Total	...	660.8		

*For sale. U. S. Bureau of the Census.

	Total Factory Sales—Units 1959	1958	1957
Jan.	120,800	109,000	144,500
Feb.	134,600	108,700	127,700
Mar.	172,600	117,900	139,400
Apr.	136,100	95,600	107,200
May	133,400	96,000	93,600
June	151,400	116,800	102,300
July	129,200	98,500	88,700
Aug.	116,600	81,400	85,800
Sept.	157,200	121,800	124,800
Oct.	143,400	135,500	120,400
Nov.	.....	129,400	116,800
Dec.	.....	143,900	113,800
Totals	.....	1,354,500	1,365,000

National Electrical Mfrs. Assn.

Large Diesel Engines—Following a 50 per cent increase in 1959 over 1958, manufacturers are scheduling another 20 per cent advance in shipments for 1960.

Textile Machinery—Next year shipments should top 1959's by 17 per cent. This year showed a gain of about 30 per cent over 1958.

Electrical Construction Material—A 3.5 per cent increase is anticipated for 1960, following an 11.5 per cent rise in 1959.

Pulp and Paper Machinery—Despite a slow start, this industry will chalk up a 15 per cent hike in shipments this year. It will be followed by another 10 to 15 per cent boost in 1960 to a near-record level.

Household Furniture—Having set a record in 1959, this industry will try to break it by 7 per cent in 1960.

Communications Equipment — Production and domestic sales volume of $2.65 billion this year will about equal the previous peak year of 1957. That means that the anticipated volume of $2.9 billion next year will set a new high mark.

Oil Field Equipment and Machinery—Despite an increase of about 16 per cent in dollar volume for shipments to this industry, the 1959 level is still about 20 per cent short of the 1957 record. A further gain of 3 per cent is expected in 1960 because of an increase of 3 per cent in domestic oil demand and more well completions (52,000 vs. 50,500 this year). However, a further decrease of 11.8 per cent in exports of oil field machine and equipment will take some of the edge off the optimism in this field.

Private Estimates Jibe

Industry spokesmen are as enthusiastic as the government about the outlook for 1960. For example, Ralph J. Cordiner, chairman of General Electric Co., declares: "1960 has all the indicators of a growth year for the economy as a whole and the electrical industry." He sees "great vitality" for home appliances, lighting, and entertainment products and "an upsurge in electric utility orders" but anticipates a slowdown in shipments of long leadtime products.

Mark W. Cresap Jr., president of Westinghouse Electric Corp., predicts a 13 per cent rise in new orders for electrical goods manufacturers. Appliances will increase 5 per cent or more; capital goods new orders will advance 20 per cent; and commercial and industrial markets will expand 14 per cent.

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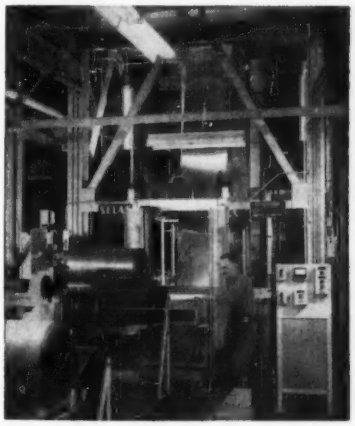

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MEN OF INDUSTRY

ROBERT W. DUNHAM
Square D div. chief eng.

CHARLES C. DICK
Lakeside Steel Improvement

JOSEPH F. KREPLEY
Olin Aluminum-Metals post

G. L. CANFIELD
Altamil chairman

Robert W. Dunham was appointed chief engineer, Molded Case Circuit Breaker Div., Cedar Rapids, Iowa, **Square D Co.** He succeeds **Dr. William Thomas,** Square D's director of corporate research, who was serving as acting chief engineer at Cedar Rapids. Dr. Thomas takes over supervision of Square D's new corporate research center under construction in Park Ridge, Ill.

Frank B. Jewett Jr., executive vice president, was elected president of **Vitro Corp. of America,** New York, succeeding **J. Carlton Ward Jr.,** named chairman. **Charles S. Payson,** the retiring chairman, was elected to the new office of chairman of the executive committee.

A. E. Petermann, vice president and general counsel of Calumet & Hecla Inc., was named president of **Alabama Metallurgical Corp.,** Selma, Ala., to succeed **Lester G. White,** resigned for reasons of health. Mr. Petermann continues as an officer and general counsel of Calumet & Hecla, which, with Brooks & Perkins Inc., jointly owns the Alabama magnesium producing company.

Robert R. Edgcomb was made sales manager, **Edgcomb Steel of New England Inc.,** Nashua, N. H.

Russell M. Braund was made administrative vice president-accounting, production, and commercial activities, for **United States Steel Corp.,** Pittsburgh. He succeeds the late **L. C. Simmons. James L. Ortner** was made vice president-accounting, central operations, succeeding Mr. Braund.

Charles C. Dick was appointed chief metallurgist at **Lakeside Steel Improvement Co.,** Cleveland. He succeeds **M. Tomko,** retired. Mr. Dick was chief metallurgist for Cletrac Div., Oliver Corp., in Cleveland.

Olin Aluminum Corp., subsidiary of Olin Mathieson Chemical Corp., appointed to its Metals Div.: **Joseph F. Krepley** as extrusion product manager, and **Richard E. Clay** as transportation sales manager. Both have headquarters in New York. Mr. Krepley was assistant product manager. Mr. Clay was manager of automotive sales for Olin Aluminum.

Hoyt Spelman joined **American Mannex Corp.,** New York, as manager, tubular products, export sales. He was with the Export Dept. of Republic Steel Corp.

Erman V. Cavagnero was made chief design engineer, **Werner Vogt** chief development engineer in the Machine Div. of **Torrington Mfg. Co.,** Torrington, Conn.

Herman L. Weiss was made general manager, Lamp Div., Cleveland, **General Electric Co.** He succeeds Vice President **George E. Burens,** who transfers to a special assignment in the Consumer Products Group, New York. Mr. Weiss was general manager, Large Lamp Dept.

Eugene W. Gehm was named sales manager, **Vulcan Containers Inc.,** Bellwood, Ill. He was assistant sales manager.

G. L. Canfield was elected chairman and chief executive officer, **Altamil Corp.,** El Segundo, Calif. Former executive vice president in charge of eastern operations, he succeeds **William H. Brown,** who relinquishes the chairmanship due to illness but remains with the corporation as a director and consultant.

L. Byron Cherry was appointed general manager, **Ozalid Div.,** General Aniline & Film Corp., New York. He replaces **Walter A. Hensel,** resigned. Mr. Cherry was executive vice president of Cinerama Inc.

Rivett Lathe & Grinder Inc., Boston, appointed **Thorwald S. Ross Jr.** vice president-manufacturing; **Walter C. Woodworth** production and procurement manager; **William R. Wright** purchasing agent. Mr. Ross formerly served for 11 years with Saco-Lowell Shops, for the last three as quality control engineer, Textile Machinery Div., Greenville, S. C.

Arthur W. Cain was appointed assistant to the president, **Plume & Atwood Co.,** Thomaston, Conn. He has headquarters in the New York office. Until recently, Mr. Cain was president of Volco Brass & Copper Co.

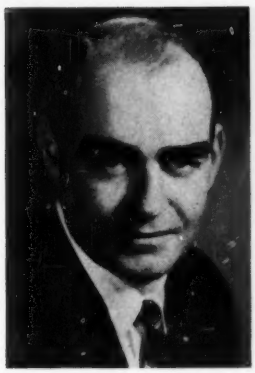
Norman P. Johnson was appointed assistant chief industrial engineer for **Norton Co.,** Worcester, Mass.

John H. Rooney was appointed manager of sales-ordnance for **National Tube Div.,** Pittsburgh, U. S. Steel Corp. He succeeds **David W. Fletcher,** retired. Mr. Rooney was

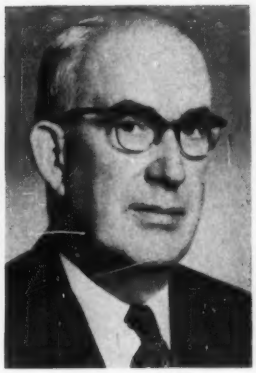
ARTHUR J. HATCH JR.

KENNETH M. LORD

Stromberg-Carlson v. p.-general div. managers



HENRY K. PORTER



JAMES G. GEDDES

H. K. Porter Inc. executives

assistant manager of sales-ordnance.

Arthur J. Hatch Jr. was appointed a vice president of **Stromberg-Carlson Div.**, Rochester, N. Y., General Dynamics Corp., and general manager of its Special Products Div. He succeeds **Anthony G. Schifino,** resigned. **Kenneth M. Lord** was appointed vice president-general manager, Electronics Div., Rochester, where he formerly served as director of engineering. He succeeds **George A. Peck,** resigned.

Richard B. Hubbard was appointed vice president; **Benjamin N. Ohannesian** production manager of **Roylyn Inc.**, Glendale, Calif. Prior to joining Roylyn, Mr. Hubbard was with Pacific Airmotive Corp. as vice president-assistant to the president, with ACF Industries as president of its Erco Div., and with Specialties Inc. as vice president. Mr. Ohannesian was director of manufacturing at Clary Dynamics Corp.

Rear Adm. **A. B. Metsger** (USN, ret.) was appointed assistant to the president of **Marquardt Corp.**, Van Nuys, Calif.

Edward L. Montgomery was appointed executive assistant to the vice president-general manager of **Aeronutronic Div.**, Ford Motor Co., Newport Beach, Calif.

Alfred Sansonetti was made vice president-manufacturing for **Avien Inc.**, Woodside, N. Y., a new post. He was manufacturing manager.

At **Kaiser Steel Corp's** central district sales office, Oakland, Calif., **A. L. Peake Jr.** was made district sales manager to succeed **C. F. Cooper,** recently made assistant general sales manager; and **R. F. Howard** was named to Mr. Peake's former post, assistant district sales manager.

Wakefield Murray was made vice president, Sheet Metal Dept., **Overly Mfg. Co.**, Greensburg, Pa. He succeeds **J. H. Goodwin,** vice president, retired.

R. W. Moellinger heads the newly consolidated sales departments of **FWD Corp.**, Clintonville, Wis. He was western manager, defense and special projects section.

Gordon M. Doherty was made Milwaukee district sales manager for **Columbia Tool Steel Co.**

Silas S. Cathcart was elected vice president-corporate planning, **Illinois Tool Works,** Chicago, and will also serve as administrative assistant to the executive vice president. **James D. Norman** was made general manager, Fastex Div., Des Plaines, Ill., succeeding Mr. Cathcart. **Harold B. Smith Jr.** succeeds Mr. Norman as sales manager, Fastex Div.

Henry K. Porter was elected president, **H. K. Porter Inc.**, Somerville, Mass. He succeeds **James G. Geddes,** now chairman, continuing as treasurer. **Francis T. Lind** was made executive vice president; **Walter E. Northcutt** vice president.

Jerome L. Ross was made assistant general manager, **Meaker Co.**, Chicago, newly acquired by Sel-Rex Corp. as a subsidiary. He was manager, Equipment Div., at Sel-Rex.

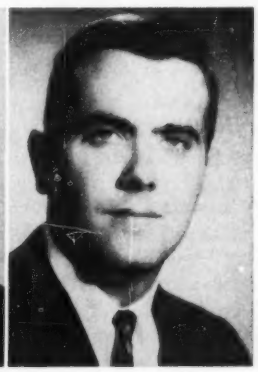
Hal Shidemantle was made manager of the Engineering Materials Laboratory of Mack Trucks Research Dept., Plainfield, N. J., **Mack Trucks Inc.** He was with Jack & Heintz Inc.

E. R. Sternberg was appointed chief engineer, White Truck Div., **White Motor Co.**, Cleveland. He was chief engineer, Autocar Div., Exton, Pa.

Allis-Chalmers Mfg. Co., Industries Group, named **Carl E. Hellerich** manager, Wichita, Kans., district;

SILAS S. CATHCART

JAMES D. NORMAN



HAROLD B. SMITH JR.

Illinois Tool Works executive positions

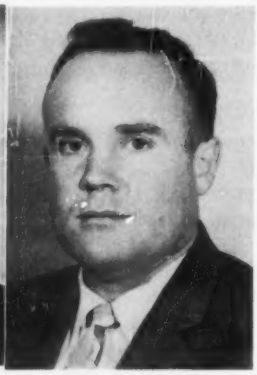
RAY A. YOUNG
Seneca Falls Machine post

ALBERT H. CLEM
Pennsalt v. p.-marketing

WALTER J. KALMEYER
Leader Iron Wks. president

A. FOSTER SHELLER
Waukesha Motor mfg. mgr.

ROBERT T. HOWARD
joins Chromium Mining



W. L. HANSON
Bethlehem Steel post

Frank R. Hunter manager, Minneapolis district.

A. Foster Sheller was named manufacturing manager of **Waukesha Motor Co.**, Waukesha, Wis. He joined the company in 1957. **Clarence W. Hahn**, production manager, was given added duties to include supervision of Manufacturing and Shop Depts.

Dr. Walter A. Dean was named assistant director of research, **Aluminum Co. of America**, Pittsburgh. He succeeds **William T. Ennor**, retiring. He was development metallurgist. **A. B. Wilber**, vice president of Wear-Ever Aluminum Inc., and manager of Alcoa's process development laboratories, retired.

J. Stewart Cruickshank was named to succeed **Lloyd E. Emley** as assistant Milwaukee works manager at **International Harvester Co.** Mr. Emley has retired due to ill health. **Jess C. Zibell** was advanced from staff assistant to succeed Mr. Cruickshank as general superintendent.

Robert T. Howard was appointed technical director of metallurgical services for Chromium Group, **Chromium Mining & Smelting Corp.**, Chicago. Mr. Howard was with Vanadium Corp. of America for ten years, followed by three years with Pittsburgh Metallurgical Corp. as chief metallurgist. He acted as technical consultant to the trade for some time prior to joining CM&S.

W. L. Hanson was appointed superintendent of rolling mills at the Los Angeles plant of **Bethlehem Steel Co.**'s Pacific Coast Div. He was assistant superintendent.

Thomas J. Powers, supervisor of waste control for the Midland, Mich., Div. of **Dow Chemical Co.**, was named to head the consulting section of Dow Industrial Service Div., Cleveland.

David H. Harden was named proposals department manager by **Republic Flow Meters Co.**, Chicago, subsidiary of Rockwell Mfg. Co.

Ray A. Young was made general sales manager, **Seneca Falls Machine Co.**, Seneca Falls, N. Y. He was sales representative for L. W. Hodson Machinery Co., Cleveland, which represented the Seneca company for many years.

Albert H. Clem fills the new post of vice president-marketing, **Pennsalt Chemicals Corp.**, Philadelphia. He is replaced as general manager, Chemical Specialties Div., by **George R. Lawson**, former director of marketing for the Industrial Chemicals Div.

Walter J. Kalmeyer was elected president, **Leader Iron Works**, subsidiary of Standard Steel Corp., in Decatur, Ill. He was vice president-manufacturing at Standard Steel's plant, Los Angeles.

W. C. Brodine was made manager, Stainless Steel Dept., **Fisher Bros. Steel Corp.**, Englewood, N. J. He was assistant general manager of Abarry Steel Co.

Leonard M. Cohen was promoted to treasurer, **Wilkening Mfg. Co.**, Philadelphia, succeeding **Henry E. Gerstley**, who is chairman. Mr. Cohen was assistant treasurer, and assistant secretary. He retains the latter post.

Sears C. Steele was promoted to assistant sales manager, sheet and strip products, for U. S. Steel Corp.'s **Tennessee Coal & Iron Div.**, Birmingham.

OBITUARIES...

R. T. Elstad, 64, president of U. S. Steel Corp.'s **Oliver Mining Div.**, Duluth, died Dec. 14.

Robert R. Schultz, 50, executive vice president and general manager, **Rogers Iron Works Co.**, Joplin, Mo., died Dec. 6.

Erwin L. Schmidt, 67, president, Acro Metal Stamping Co., Milwaukee, died Dec. 12.

Kenneth E. Dinius, 57, chief engineer for **U. S. Steel Corp.**'s South Works, Chicago, died Dec. 16.

Arthur B. Cooper, 48, assistant to the president, **Jessop Steel Co.**, Washington, Pa., died Dec. 16.

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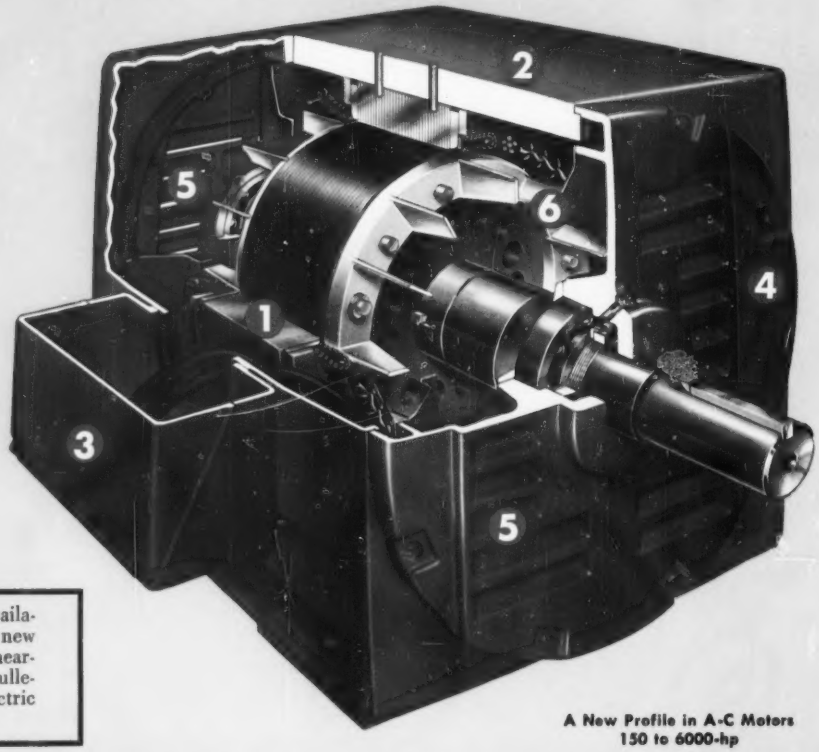
2. **BETTER CONSTRUCTION**—Cast iron frame withstands 20G simulated transportation shock tests; resists corrosion.
3. **FASTER INSTALLATION**—Conduit box has up to 3 times volume of ordinary boxes; lifting lugs, cast to frame, hold up to 12 times motor weight.
4. **EASIER MAINTENANCE**—Flat end shields are more adaptable to addition of accessories or modifications; are lighter—easily handled by one or two men.
5. **BETTER COOLING**—Double-end ventilation, new duct design and louvred air openings provide more efficient air distribution through motor, reduce hot spots.
6. **LOWER NOISE LEVEL**—Sound power has been cut up to 50% by redesigning frame sections, rotor fans, air deflectors and intakes.



A New Profile in A-C Motors
150 to 6000-hp

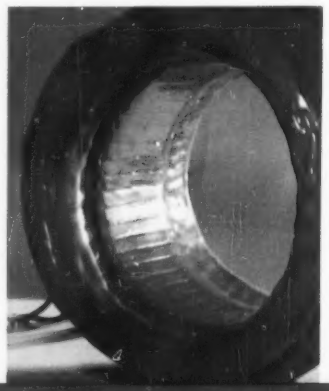
FOR COMPLETE INFORMATION and availability dates about General Electric's new Custom '8000' motor line, contact your nearby Apparatus Sales Office, or write for bulletin GEA-6865, Section 884-2, General Electric Co., Schenectady, N. Y.

NEW *Polyseal** SILICONE RUBBER INSULATION SYSTEM IS AVAILABLE ON CUSTOM '8000' MOTORS

Silicone rubber used in Polyseal insulation systems is a product of General Electric's Silicone Products Dept., Waterford, N. Y. . . . a leader in research, development, and manufacture of silicone materials. Supported silicone tape is a development of General Electric's Insulating Materials Dept., Schenectady, N. Y. Combining silicone rubber with dacron-glass supporting materials is a major engineering advancement, giving this material both the mechanical and dielectric strength required for use as a motor insulation. Polyseal insulation systems are available *only* on General Electric motors. Medium AC Motor & Generator Dept.

FORM-WOUND MOTORS

Polyseal supported silicone rubber insulation system provides greater mechanical, thermal, voltage and environmental endurance than unsupported silicone rubber. Glass fabric materials are imbedded in each layer of silicone tape, which, after coil wrapping is vulcanized under heat and pressure to seal the system against moisture and contaminants. General Electric form-wound open motors with Polyseal insulation system can be used in some severe atmospheres formerly reserved for totally-enclosed motors.



RANDOM-WOUND MOTORS

Polyseal silicone insulation system offers greater flexibility and better heat transfer than existing encapsulations . . . it operates effectively from −90C to 200C and will not crack under excess thermal cycling or severe moisture. After receiving G.E.'s standard random-wound insulation treatments, Polyseal insulation is applied to stator and end turns, completely sealing windings with a thin, waterproof, inert covering which protects against extreme moisture, most chemical fumes, dust and corrosion.

*Trademark of General Electric Co.

Progress Is Our Most Important Product

GENERAL ELECTRIC

Reynolds to Build Silicon Metal Plant

A SILICON plant will be built by Reynolds Metals Co. at its Listerhill reduction plant near Sheffield, Ala. The electric furnace facility will have a capacity of about 5000 tons of silicon metal a year. Construction is scheduled to begin about the middle of 1960.

The project is required to handle the firm's increasing production of silicon aluminum alloys for the foundry industry. Silicon is added to aluminum to increase hardness and castability. Automobile castings, for example, usually require aluminum alloys containing 5 to 12 per cent silicon.

The 3600° F electric furnace will be supplied by the Electromelt Furnace Div., McGraw-Edison Co., Pittsburgh.

Silicon metal is produced from quartzite which is found in central Alabama and in North Carolina.

Moves Diecasting Unit

Dow Metal Products Co., a division of Dow Chemical Co., has transferred its magnesium and aluminum diecasting production operation from Midland, Mich., to Bay City, Mich.

Buffalo Steel Modernizes

Buffalo Steel Corp., Tonawanda, N. Y., has started a $400,000 modernization of its rolling mill. The program includes installation of new shearing tables and the conversion of a portion of the mill from 25 to 60 cycle power. A. E. Klinger has been named chairman and has been succeeded as president by J. L. Frankel. Buffalo Steel is owned by Rochester Iron & Metal Co., Rochester, N. Y.

Engelhard Adds New Line

Engelhard Industries Inc., Newark, N. J., established an Industrial Diamond Div. which will import, stock, process, and sell industrial diamonds; provide technical service, application engineering, and basic research to industrial users of diamonds. The company is a supplier and fabricator of platinum and other precious metals.

Engelhard estimates that industry uses about $43 million worth of diamonds annually.

Fafnir Expands Plant

Fafnir Bearing Co., New Britain, Conn., will double the size of its Newington, Conn., plant to increase capacity and reduce costs. The expansion will enable the company to process larger size rings from start to finish in a one floor operation. At present, only machining and heat treating operations are performed at the Newington plant.

NEW OFFICES

Wolverine Tube Div., Calumet & Hecla Inc., Allen Park, Mich., opened district sales offices in San Francisco under the management of J. A. Marshall and in Los Angeles under the managership of H. F. Powell. The division also named R. C. Crowe sales manager, New York district, and R. B. Davis manager of industrial sales at Wolverine's administrative office in Allen Park.

Kaiser Aluminum & Chemical Corp., Oakland, Calif., opened an automotive business development office at 2480 W. Maple Ave., Birmingham, Mich. Automotive industry and district sales offices of the company are at 7700 Second Ave., Detroit.

Strategic Materials Corp., Buffalo, opened a branch office at 161 E. 42nd St., New York 17, N. Y., to handle meetings and negotiations by prospective licensees of the company's metallurgical and chemical processes.

Scherr-Tumico Co. will open a Midwest regional sales office at 5045 W. Harrison, Chicago 44, Ill., on Jan. 1. D. W. Freyberg will be in charge. The eastern office is George Scherr Co. Inc., 200 Lafayette St., New York 12, N. Y. The Midwest office and factory is Tubular Micrometer Co., St. James, Minn. The West Coast office is Scherr-Tumico Co., 3337-39 W. Olympic Blvd., Los Angeles 19, Calif.

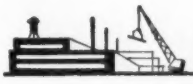
ASSOCIATIONS

Electric Overhead Crane Institute Inc., Washington, elected these officers: President, W. H. Morgan, Morgan Engineering Co., Alliance, Ohio; vice president, W. W. Peattie, Northern Engineering Works, Detroit; executive secretary and treasurer, J. H. Peritz; and general counsel, C. M. Dinkins.

Conveyor Equipment Manufacturers Association, Washington, elected these officers: President, O. A. Johnson, Gifford-Wood Co., Hudson, N. Y.; vice president, E. H. Woodberry, Lamson Corp., Syracuse, N. Y.; secretary, G. H. Woodland, Chain Belt Co., Milwaukee; treasurer, H. A. Barber, Barber-Greene Co., Aurora, Ill.; and executive vice president, R. C. Sollenberger.

Spring Manufacturers Association Inc., Bristol, Conn., elected these officers: President, H. C. Faust, Paragon Spring Co., Chicago; vice president, Donald Jacobson, Newcomb Spring Co., Southington, Conn.; and executive secretary, George Underwood.

Aluminum Extruders Council, Philadelphia, elected M. J. Smith, Trim Alloys Inc., Boston, president and chairman. L. C. Laderer, Wells Aluminum Corp., North Liberty, Ind., was named executive vice president.



NEW PLANTS

Electronics Div., Gabriel Co., opened its $2 million plant at Millis, Mass. It has 70,000 sq ft and will replace facilities in Needham Heights, Mass. The division makes antennas, space capsule antenna systems, and a diversified line of components for space tracking apparatus.

Steelite Buildings Inc., Pittsburgh, moved to its new plant at Masury, Ohio. The firm fabricates corrugated galvanized metal sheets to longer-than-standard size. Lengths are limited only by truck and rail shipping accommodations.

OUTLOOK TEC

Cutler-Hammer 505 Mill Brakes

now in seven sizes . . .
first complete line to meet the latest AISE-NEMA Standards

These are the features that have made the Cutler-Hammer 505 Mill Brake the choice of Mill Engineers everywhere. Compare it . . . test it . . . prove it. The 505 Mill Brake is built better to last far longer.

Only ten major components; the ultimate in design simplicity . . . avoids the clutter and trouble of complex linkage systems.

Over-the-wheel pull rod provides a one-to-one leverage ratio; reduces the lower bearing pressure by absorbing half the braking force.

Single, weatherproof operating coil easily accessible and reversible. Leads can be brought out in either direction.

Shoe clearance can be adjusted even in total darkness. No dials to read, no sticking gauges, no complicated mechanisms to maintain.

All adjustments made with an ordinary wrench, and all nuts are above the motor shaft for easy access.

No lubrication required. Oversize bearings have extremely low pressures; can't stick or bind.

Compact rectifier panels bring all the plus features of the rugged 505 Mill Brake to jobs where only A/C power is available.

Get all the facts before you decide. Write today for detailed description and data. Bul. 505-Z213. Cutler-Hammer Inc., Milwaukee 1, Wisconsin.

CUTLER-HAMMER CONTROL CH

CUTLER-HAMMER

Cutler-Hammer Inc., Milwaukee, Wis. • *Division:* **Airborne Instruments Laboratory.** • *Subsidiary:* **Cutler-Hammer International, C. A.**

Associates: Canadian Cutler-Hammer, Ltd.; Cutler-Hammer Mexicana, S. A.; Intercontinental Electronics Corporation.

Technical Outlook

STRONGER ALLOYS—New findings on the strength of experimental aluminum-copper alloys point up the fact that fewer, not more, metallic particles increase the strength of alloys, says Battelle Memorial Institute, Columbus, Ohio. Although increased spacing between such particles increases weakness, the trend reverses itself to increase strength.

REDUCES BREAKAGE—Use of laminated plastics for insulated electrical parts cuts breakage problems during mechanical handling, says Grigsby Co. Inc., Arlington Heights, Ill. Modern types combine good punching characteristics and retain electrical insulating properties in high humidity.

SHORT CIRCUIT DAMPER—A new epoxy-type plastic can be sprayed or painted on surfaces to prevent electrical arcing, claims Westinghouse Electric Corp., Pittsburgh. (It will market the liquid in spray cans.) Dr. C. E. Arntzen, manager of the materials laboratory, described the material as a significant development for use with organic insulations in electrical apparatus.

TIN IMPROVES CAST IRON—Tin can be controlled to increase wear resistance and improve machinability, states the Tin Research Institute, Columbus, Ohio. It is not proposed for tensile strength or hardness improvement. More work is being done to confirm its role as a promoter and stabilizer of pearlite.

NEW INDIUM SUPPLIER—High purity indium makes bearing surfaces nonseizing, longer lasting, more resistant to corrosion, says High Purity Metals Inc., Hackensack, N. J.

STEELS THAT TAKE SHOCK STRESSES—Quick, shock-type loading of low carbon specimens shows that steels can take stresses which greatly exceed the yield point determined by ordinary, static testing, claims the Naval Research Laboratory, which is attempting to better understand yielding. Details are in PB 151685 the Department of Commerce's BB 151685 (Cost, 50 cents).

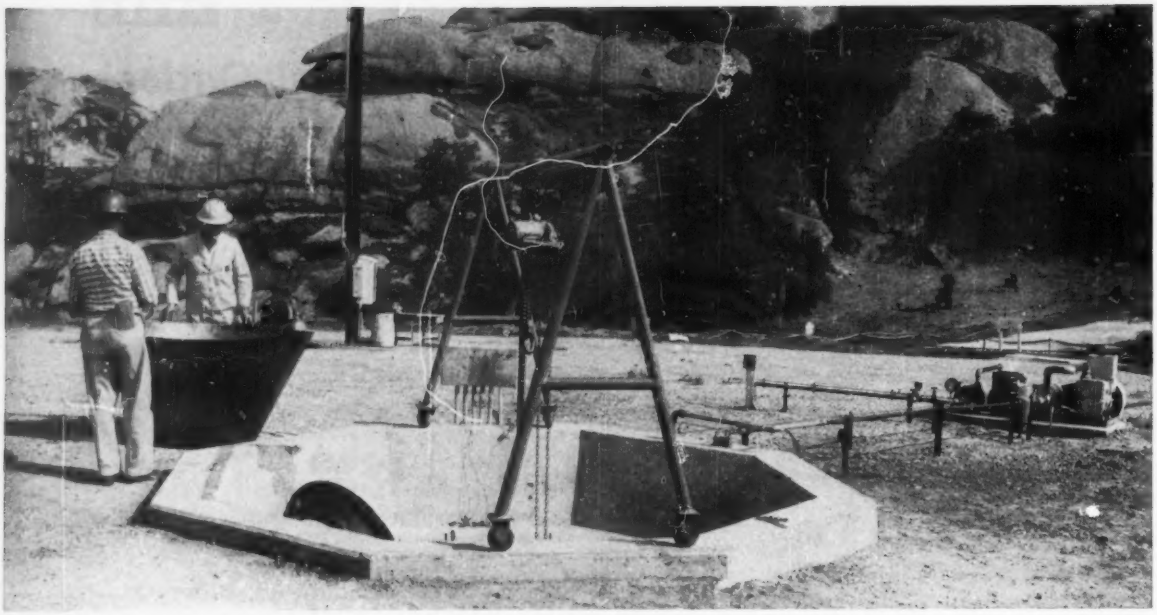
SCREWS COATED WITH PLASTIC—Insulated metal screws aid fabricators in solving unusual fastening problems. Metal cores can be magnetic or nonmagnetic and have some special property, such as the low melting alloys used in fire prevention. Austin Screw Products Co., Chicago, also says the plastic coating comes in a wide variety of shapes.

2 MILLION PSI STEEL?—It may be possible to produce metal compacts with tensile strengths between 1 million and 2 million psi, says Walter Crafts, president, American Society for Metals, Cleveland. Researchers await production of metal particles about 1 ten millionth of an inch in diameter. They would permit a perfect arrangement of atoms.

EXPOSE WATER-BASE PAINT—A study by Dow Chemical Co., Midland, Mich., relates the type and extent of outdoor failures of water reducible paints to the base (latex) system and the wood substrate. Result: A group of coatings which will measure up to weathering needs, ASTM West Coast members were told recently.

SMOOTHER NICKEL COATING—A new process called Superlume yields superior nickel coatings which are exceptionally bright at high and low current densities. The process will level out scratches to an extraordinary degree, claims Hanson-Van Winkle-Munning Co., Matawan, N. J.

BOOSTS PHYSICAL PROPERTIES—Several magnesium alloys have higher than expected physical properties at elevated temperatures, reports Boeing Airplane Co., Seattle. Reason: Short time cycles encountered in missiles provide unique conditions not encountered in standard testing procedures.



1. Two Rocketdyne workmen are placing an AISI 1018 blank into equipment which illustrates how simple exploratory setups can be. Concrete pit is 12 ft in diameter, 9 ft deep. A water and a vacuum pump are attached with permanent plumbing. Hoist raises and lowers dies and formed products

Explosive Forming Tested by Rocketdyne

This series of pictures suggests ways you can start similar installations

3. Blank being lowered into die clearly shows welded seams and part size. It is 60 in. across at the top, 30 in. at the bottom. Two hold-down rings are used—one at top and bottom. The lower one is faced with rubber to insure a good seal

4. Detonating type explosive is carefully placed in a centering device wired in place in the upper half of the die cavity which is subsequently filled with water. This view also clearly defines blank placement, and hold-down details of the operation

2. The concrete die cavity is faced with plastic held in place with a hold-down ring. Black O-ring forms seal against blank for vacuum between die and blank. Workman is installing pressure recording device

THE STAFF at Rocketdyne firmly believes that explosive forming has a future in its metalworking operations.

The division of North American Aviation Inc., Canoga Park, Calif., has already accumulated enough data to spell out the profitable production areas.

Highlights of the facts gleaned from its experiments include:

First cost of a facility is far less than that of a comparable machine tool installation.

Thick stock is easier to form than thin. Parts have fewer wrinkles, fewer tears, and are easier to handle.

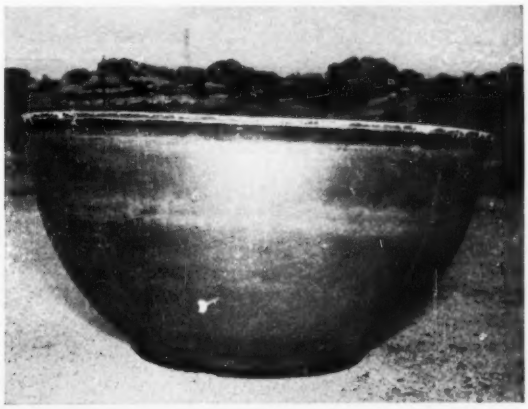
Part bigness is no problem. Explosives have comparatively unlimited forming ability.

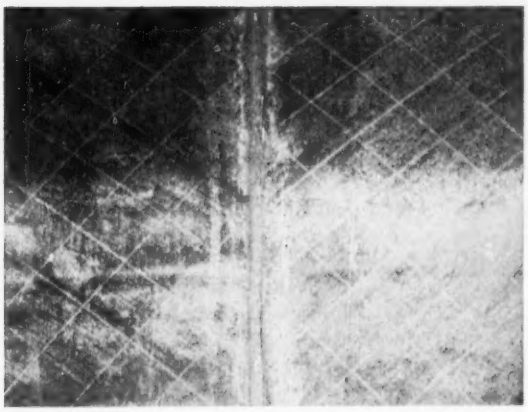
Metal sandwiches can be formed without destroying core material.

Springback and welds occasionally are problems in forming titanium.

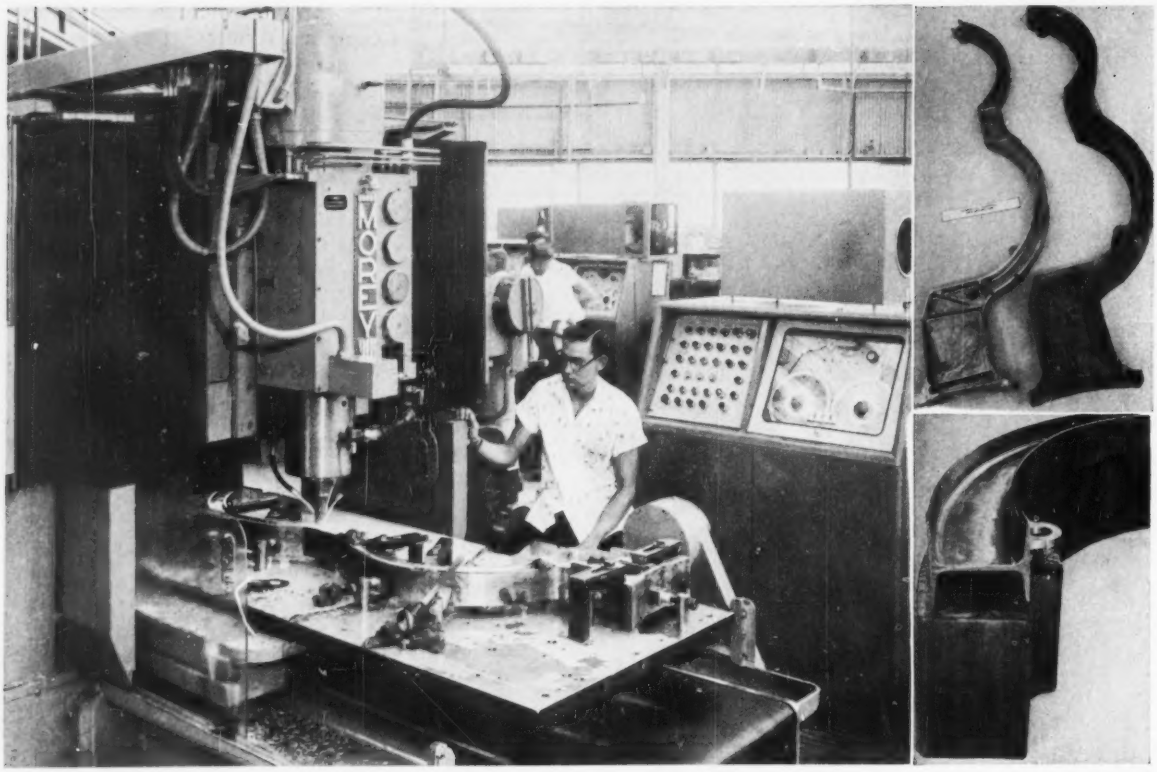
• An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.

5. Away she goes! Water column varies with explosive size. Rocketdyne has used from 50 to 250 grams—this shot was maximum. Water makes top rate transmitting medium besides being cheap and easy to handle. Three shots were required to finish the shape





6. Here is the result—a perfectly shaped bowl. Welds are unbroken. Surface is smooth without wrinkles or ripples. Flared areas at top and bottom will be trimmed in a vertical boring mill. Close-up of weld and scribed pattern illustrates perfectly even deformation



As an operator becomes spectator, one of a battery of three Morey profilers steers itself through an intricate AISI 4340 steel yoke that will be used to mount the two jet engines to Lockheed's Jetstar. The two pictures at right show the rolled plate billet and the finished part. Some 800 lb of metal are turned into chips in this operation

Numerical Control Is Troubleshooter

Tape and card guided machine tools have added new levels of efficiency to some of aircraft's toughest contouring jobs. Machining time is cut; quality is up

PRODUCTION men at Rohr Aircraft Corp., Chula Vista, Calif., have turned one of the country's largest installations of numerically controlled machine tools into a battery of production troubleshooters. Their ten tape and card-guided contouring machines are expediting some of the company's most complex parts.

Unlike most other installations, the one at Rohr has done much of its work on tough aircraft and missile steel alloys.

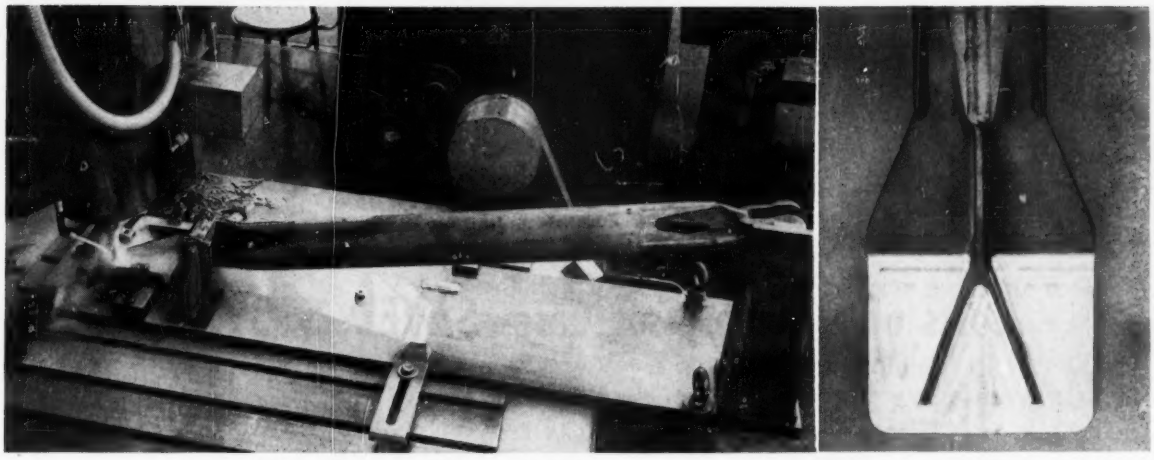
• **Streng hs Are Proved**—Rohr experts point up some of the system's advantages: First, they say, numerical control can lead to better finishes on the work. Also, tooling costs can be trimmed; machining times are reduced; and the lead-time on many parts can be slashed.

In some types of manufacturing, the numerical control machine can reduce tooling costs by eliminating the need for time-consuming model making.

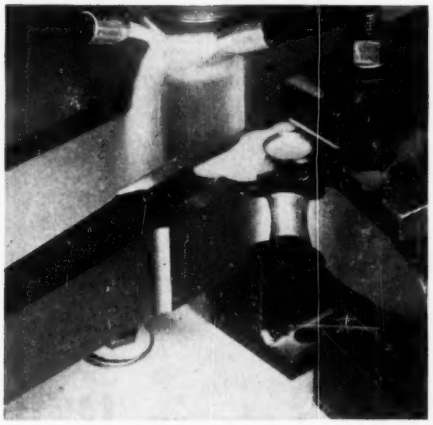
• **Inventory**—The numerically controlled machines include: Five Morey vertical profiling machines, guided by Electronic Control Systems' magnetic tape controls, a Giddings & Lewis horizontal profiler, two Cincinnati skin mills, and a Cincinnati horizontal profiler. In addition, an Electronic Control Systems Digimatic director has just been installed. (With it, Rohr automatically assumes the responsibility for providing tape service to all area plants operating similar machines.)

Adequate rigidity of the machines is a key to their use on steel alloys, say Rohr machine specialists. The Morey machines were designed for steel cutting. Consideration is being given to converting both horizontal profilers for ferrous cutting.

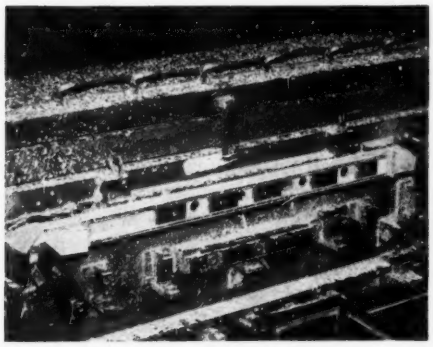
Tape control payoff can be dramatic. Rohr engineers cite the example of an engine pod fitting for the Boeing B-52G engine pod. They used to allow 18 hours for machining the part; now they allow 6.2 hours, and the part tolerances are held more closely than ever before.



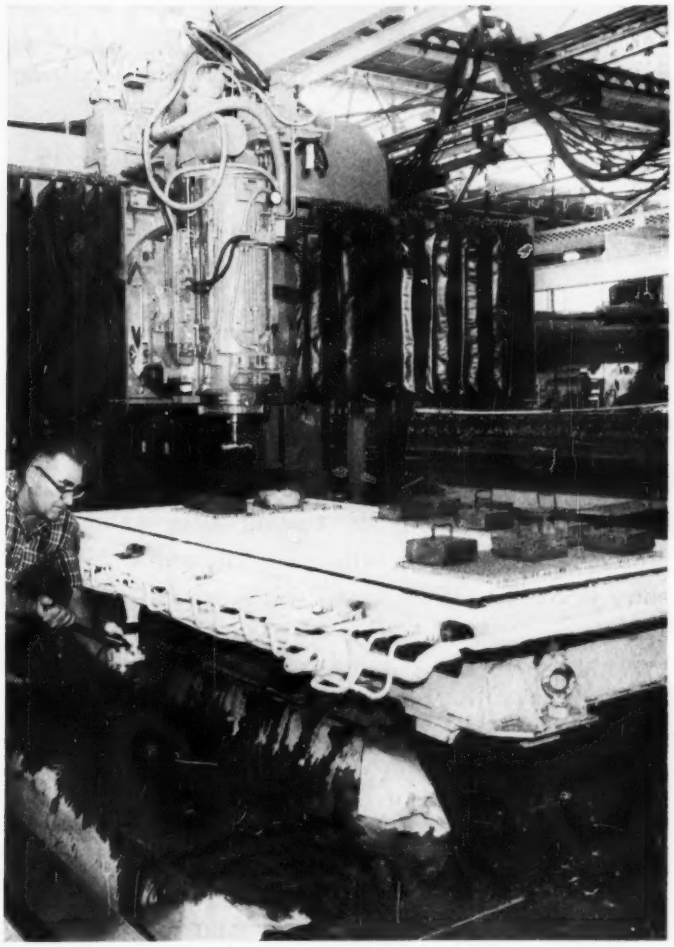
This AISI 4130 spade fitting used to take 2½ hours to contour. With numerical control, the cycle time has been cut to 1.3 hours. This weldment becomes part of the B-52G engine pod. Photo at right shows the milled surface



It used to take an operator and a conventional machine tool 3.55 hours to make this "duck-bill" midspar fitting for the Boeing KC-135 jet tanker. With tape control, it takes 2.2 hours. Material is AISI 4130 steel



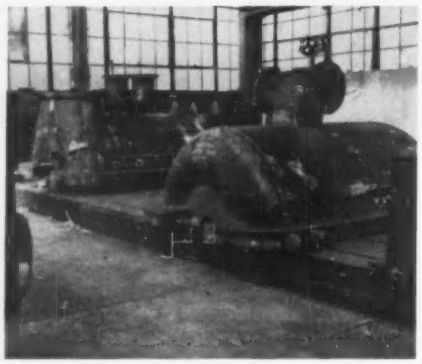
This longeron for the Lockheed C-130B (made from Dural) used to require seven machine setups for completion; it now takes three. Time for the job used to be 10½ hours. On this numerically controlled Giddings & Lewis horizontal profiler, it takes only 5½ hours



Sections of stainless steel honeycomb core stock are held in a freezing chuck on this 8 by 30 ft, card controlled Cincinnati mill. At Rohr, two of these five-axis machines allow milling to any desired configuration

THE COST CRISIS . . . How to Beat It

Costs of a Compressor Case—SAVED: $339.90



	Single Casting	Casting-Weldment
Net weight	4420 lb	2164 lb
Material cost	$806.37	$406.10
Labor & burden	42.10	148.70
Pattern cost	4.25	0.75
Fixture cost	—	3.15
TOTAL:	$852.72	$558.70
Metal machined	380 lb	135 lb
Total cost of part after machining	$923.92	$584.02

Design Change Cuts Material Costs in Half

New technique combines casting and welding. Finished product costs also are reduced. This article is based on an entry in STEEL's 1959 Cost Crisis Awards Competition

BY REDESIGNING compressor casings, engineers at Worthington Corp., Harrison, N. J., slashed material costs in half. Over-all manufacturing cost of the parts dropped 36½ per cent.

John Mikulak, assistant to the vice president of manufacturing, points out that his company and the rest of the industry have normally made the parts from large, complex castings. As a result, they are often heavy and cumbersome to process.

• **Into Pieces**—New designs for the Worthington cases call for an assembly of relatively smaller components.

The processing arrangement now combines castings and rolled plates into a weldment.

Since wall thickness can be closely controlled in the plate, over-all machining of the sections is eliminated. In many cases, a reduced wall thickness can crop gross weight from the finished part.

Components are simpler to handle and to process than the original large parts.

At Worthington, the new technique is being used on five different product sizes.

On that point, Mr. Mikulak comments: This proves that "even on small lot production, and on manufacturing assemblies to orders in five different sizes (all similar design), substantial gains can be made by using an unprejudiced approach . . . where the traditional concepts are disregarded."

Added benefits, says Mr. Mikulak, include a reduction in pattern costs, the advantage of being able to insert special metals in critical areas, and lower scrap costs due to ease of salvage by welding.

Machine Tool Builders Look at 1960

In predicting trends, many builders cite the requirements of the company that makes parts in limited production runs. Numerical control is one point of emphasis

PRODUCTION men besieged by the complexities of squeezing efficiency into short lot runs may be in for an assist from the machine tool industry.

Commenting for the Forum on Technical Progress in next week's issue of STEEL, many machine tool builders committed themselves to special emphasis on problems of the job shop.

• **Sample Quotes**—Forum participants were asked by STEEL's editors to forecast the important trends and developments of 1960. Here are sample quotes from machine tool builders:

"Our concern is turning more and more toward automating the medium production metalworking manufacturer," says one builder solidly identified with machines used by long run product makers.

"The day of expensive, single purpose tooling is fast ending. High productivity for short runs is the keynote as 1960 begins," comments another builder.

"The small job shop is becoming more familiar with broaching, and most of the (1960) machines will satisfy his needs and his pocketbook," predicts another.

A leading builder of standard machines says: "1960 . . . will show a continuing acceleration of the most significant trend of recent years in metalworking—bringing the advantages of automatic cycling machine tools into smaller and smaller lot sizes, to make job lot manufacture more automatic."

• **Leading Contender** — Ranked at the top as a short lot aid is numerical control. The 1950s saw the maturity of full scale, transfer type automation. Simultaneously, numerical control was weaned from the electronic test stage to a production reality.

Now, say the builders, numerical control, both positioning and continuous path, will mature into an economical tool for nearly every limited run production line.

• **Nontape Support**—Although numerical control is walking off with most of the headlines, other innovations will make important contributions, say the builders. Better electrical, electronic, and mechanical control systems should help gear machines to higher productivity levels.

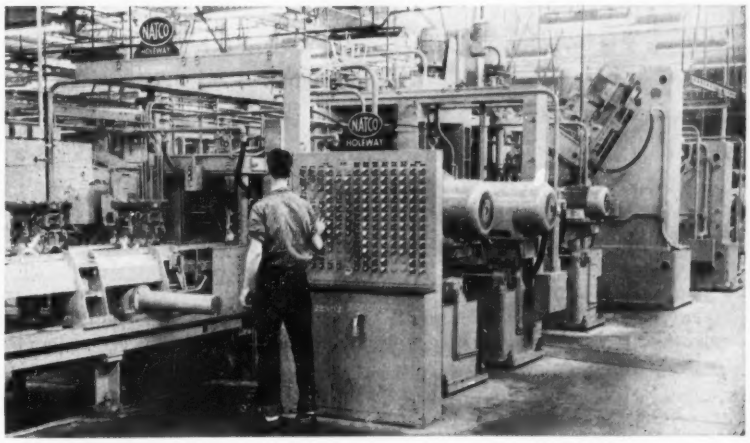
Here's another: "We visualize lines . . . of standard machines with transfer devices between them. Each machine would have its own hydraulic and electrical system and could be put into the line (or removed from it), depending on whether its operations were needed in machining the part. The self-contained machine, once removed from the line, could be used elsewhere in the plant."

In addition to the emphasis placed on short runs, the Forum commentors reveal intensive development work on the fundamentals of machining. New tool materials, for example, should whip some of the high alloy machining problems. Machine downtime has become the target for many builders' development engineers.

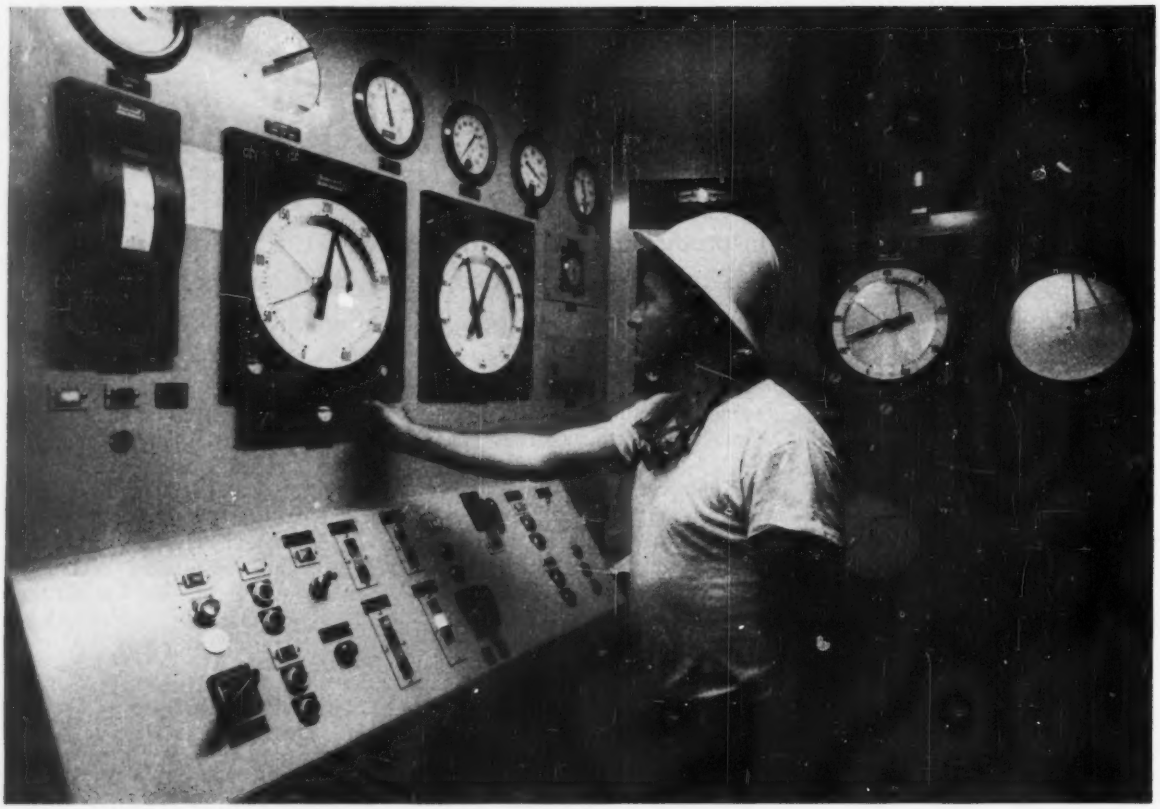
Brake Is Whopper

Two 22 ft press brakes have been installed in tandem at Whiteway Mfg. Co., Cincinnati. The combination machine can provide either synchronized or individual operation of the two brakes.

It can be used to produce a 40 ft light pole, bending it from steel sheets up to ¼ in. thick. The unit was built by Cincinnati Shaper Co., Cincinnati.



NEW DESIGN ON THESE TRANSFER MACHINES permits machining of all faces on in-line and V-type engine blocks. Forty working stations on three of these units do 485 machining jobs. Built by National Automatic Tool Co., Richmond, Ind., the machines are installed at Detroit Diesel Engine Div., General Motors Corp., Detroit



Steelworker checks instruments that control oxygen flow to top blown converters. Duplicate control systems operate the company's two steelmaking units

Acme Steel Automates Oxygen Converters

Instruments govern process at new plant. Two identical systems operate the two converters. Recorder-controllers regulate oxygen flow, and the flow of water to an exhaust cooler that protects precipitators

AUTOMATION of oxygen converters keeps steel analysis close to specifications at the new Acme Steel Co. plant in Riverdale, Ill., in the company's first bid as a steel producer.

Two instrumentation systems at the plant are under the control of a supervisor. Each system can be used with either of the company's two converters. Controls were supplied by the Calumet, Ill., branch of Brown Instrument Div., Minneapolis-Honeywell Regulator Co.

• Recorder-controllers regulate oxygen flow to the converters, and the flow of water to exhaust gas cooling towers.

Each heat of steel requires a different amount of oxygen, depending on the composition of molten iron in the charge, and the grade of steel to be made. Totalizer controls maintain an accurate check on oxygen flow, and insure delivery of the right amount.

The systems also control the flow of water to the cooling towers, used to lower exhaust gas temperatures and protect precipitators.

Process information is transmitted to recorder-controllers, which compare measurements with specified values. If differences are detected, oxygen and water line valves are repositioned pneumatically to maintain the correct flow.

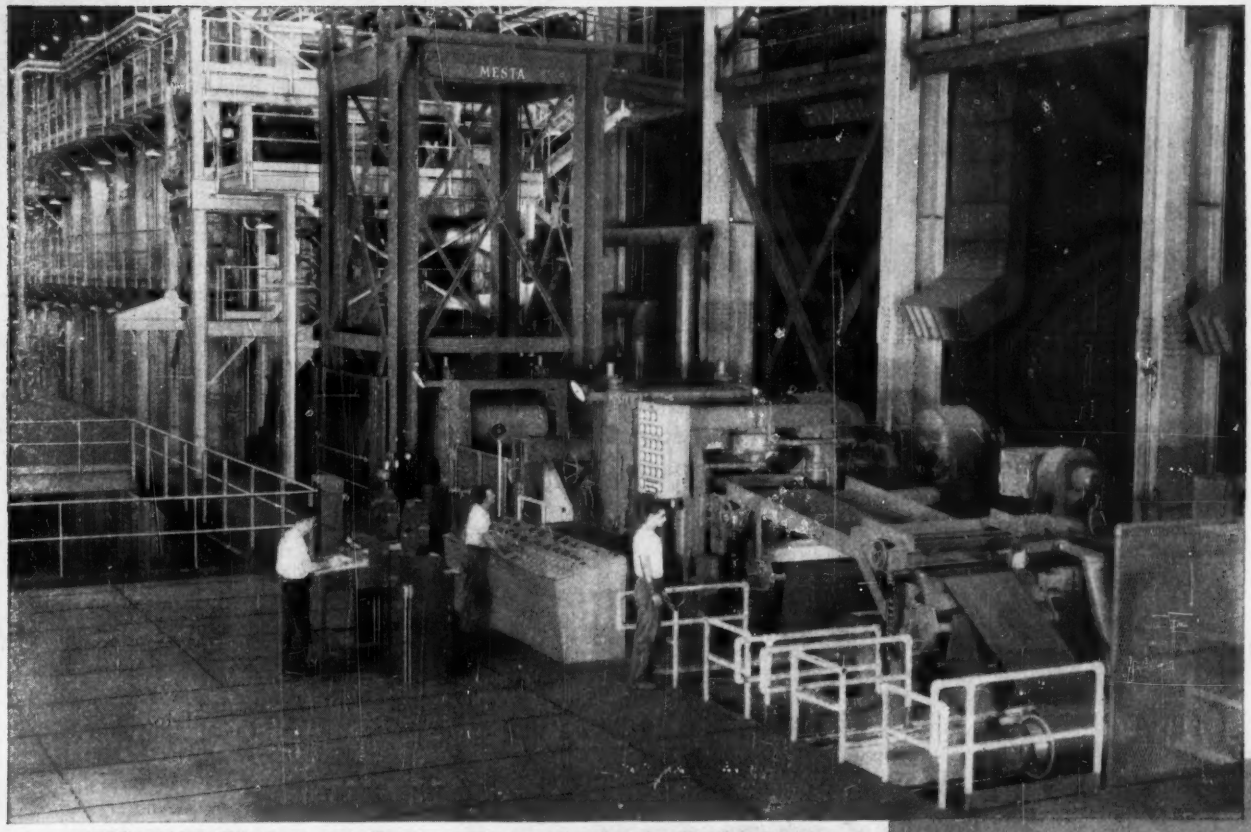
• The company expects to make most of its own steel. Formerly, operations were limited to fabrication.

The new, $33 million plant includes hot blast cupolas, which provide hot metal for the converters.

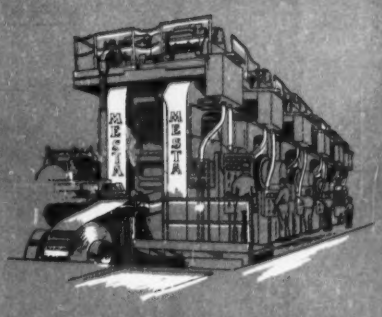
Initial capacity of the plant is 450,000 ingot tons annually. That represents about 70 per cent of the billets and slabs needed by the company for fabrication.

CLEANING AND ANNEALING LINES

Designed and Built by **MESTA**



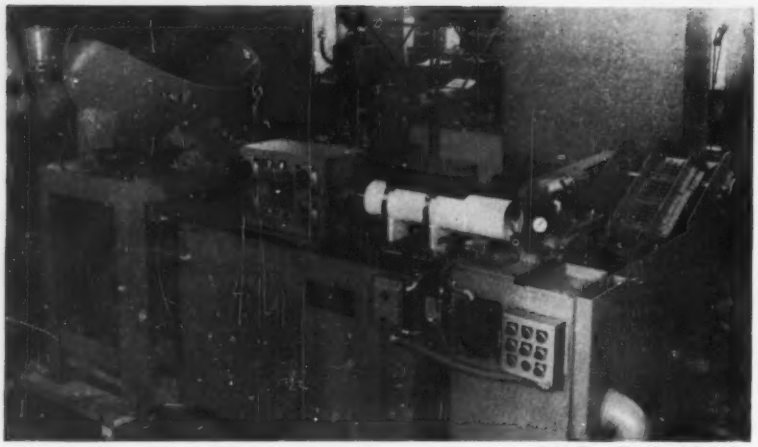
MESTA 2000 FPM Continuous Cleaning and Annealing Line for Steel Strip in Tin Plate Gauges with Pay-Off Reels, Mash Welder and Tension Reels in Operation at Weirton Steel Company, Division of National Steel Corporation.



Designers and Builders of Complete Steel Plants

MESTA MACHINE COMPANY

PITTSBURGH, PENNSYLVANIA

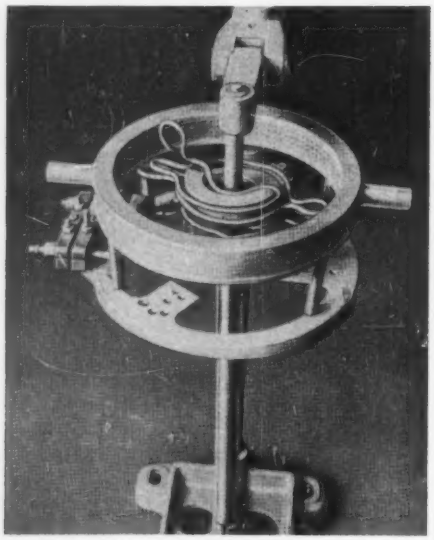


Tocco Div., Ohio Crankshaft Co.

Automated line for through heating and hardening of carburized piston pins. Only handling required: Loading of charge hopper and removal of treated pins at discharge conveyor

How and When to Use Induction Heating

New uses for a versatile heating method, plus expanded applications in well-known areas, are lifting equipment installations, solving metallurgical problems. Suppliers are optimistic



Allis-Chalmers Mfg. Co.

Only the top portion of this camshaft is to be hardened, so the coil is patterned to control heat placement

MANUFACTURERS of induction heating equipment seem to be wearing a permanent smile these days —and no wonder! Sales in the first ten months of this year were 139 per cent above those in the corresponding period last year and nearly double the total for all of 1958.

Suppliers expect sales to continue at better than a million dollars per month because of expanding uses for the method and the growing tendency to handle operations continuously, which is causing many manufacturers to re-evaluate processing.

Also contributing to the optimism: New equipment has been developed, and more processes are ready to emerge from development laboratories.

• **Transformer Principle** — Induction heating is based on the ability of metals to conduct a current. (High frequency power can also heat nonconductors such as plastics. Electronic ovens and diathermy machines are further examples of what is called dielectric heating.) To heat metals by induction, the work is made the secondary of a transformer; the inductor coil is the primary. An iron core, common in power transformers, is rarely used for induction heating. The secondary is effectively a single turn and is shorted; it carries relatively large currents which show up as heat.

Magnetic materials also develop heat through hysteresis (the same magnetic friction which causes Junior's train transformer to heat up when it's plugged in, even if the trains aren't running).

Makers of induction equipment also have to consider the "skin effect." Explanation: The induced current has a tendency to push to the outside of the workpiece; higher frequencies concentrate more of the current and heat on the outer surface—the principle can be used to obtain a hardened surface with a ductile core. For production work, a frequency is selected which will give the desired depth of heating.

Depth of heating is an inverse function of the square root of the frequency, so it is possible to adjust the heat penetration by varying the input frequency. Work temperature is governed by the power input and the period of ap-

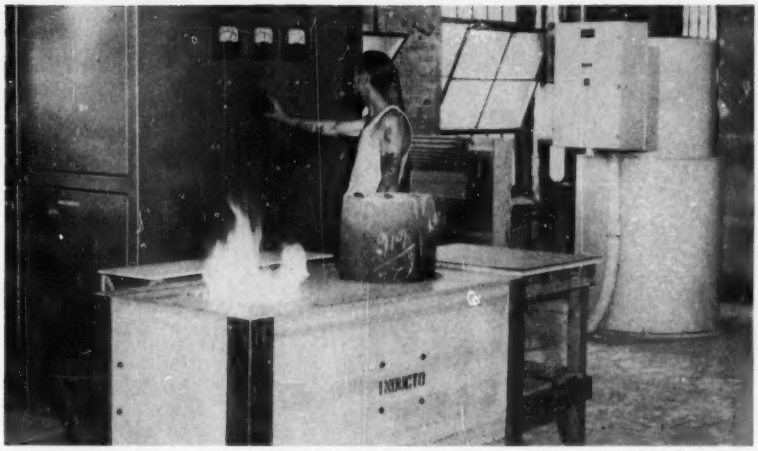
plication. There is little tendency for heating to occur outside the coil area; heating of a relatively small spot is possible where a local anneal is desired.

As would be expected, the nature of the material also affects the way it reacts to the induction coil. Permeability and resistivity, the other factors influencing penetration of the heating current, are dependent upon the charge material. If the charge material is constant, the remaining variable is frequency, so it is adjusted to secure the required depth of penetration.

• **Equipment Varies** — Induction apparatus, widely varied, can take many forms. The nature of the equipment will depend on the job to be done and the frequency required. Some apparatus operates at 60 cycles, the normal frequency of alternating current supply. A transformer, often with capacitors to correct the power factor, is the heart of this type installation. Used for heating large cross sections, line frequency installations are employed for melting of nonferrous metals, heating of billets for forging and extrusion, and similar applications.

Static type circuits may be used to provide frequencies higher than the line input. A recent innovation is a device which, from a three phase, 60 cycle input, provides a 180 cycle output. Although the frequency is triple that of the input, no moving parts or vacuum tubes are employed.

For somewhat higher frequencies, rotating converters (motor-generator sets) are often used. They may be two separate units, or both sets of windings may be enclosed in a single housing. Often, the single shell type is constructed with a vertical rotor, with a resulting saving in floor space. For practical reasons, such equipment is usually designed for output frequencies of 10,000 cycles or below. Such motor-generator sets can be built to supply up to 1500 kw output, to supply coreless induction melting furnaces up to 10 tons in capacity. They are also used for billet heating. Forced cooling can reduce the size of motor-generator units; efficiency of the units tends to decrease at higher frequencies and may run from 90 to 60 per cent.



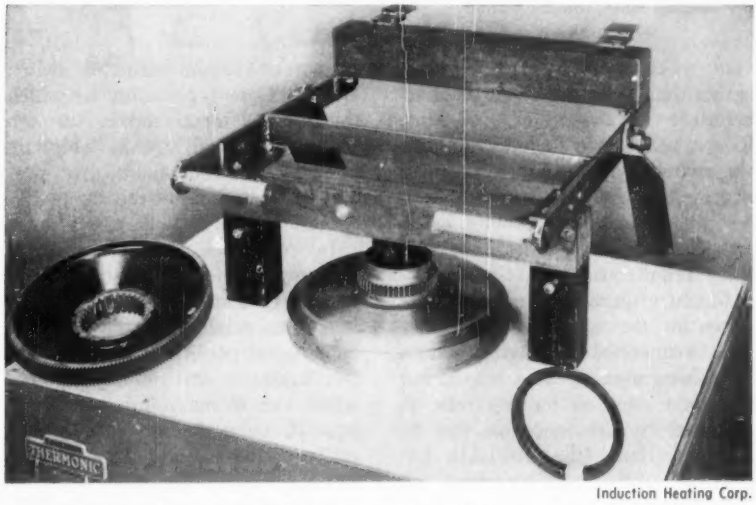
Inductotherm Corp.

Crucible melting using induction. Power source, in background, is a vertical motor-generator set, completely enclosed. Switchboard permits individual control of the crucibles

The oldest known method for the production of high frequency energy is still widely used. The spark-gap oscillator has the advantages of electrical and mechanical simplicity and is used in the range of 12,000 to 60,000 cycles—the lower frequencies are generally used for melting.

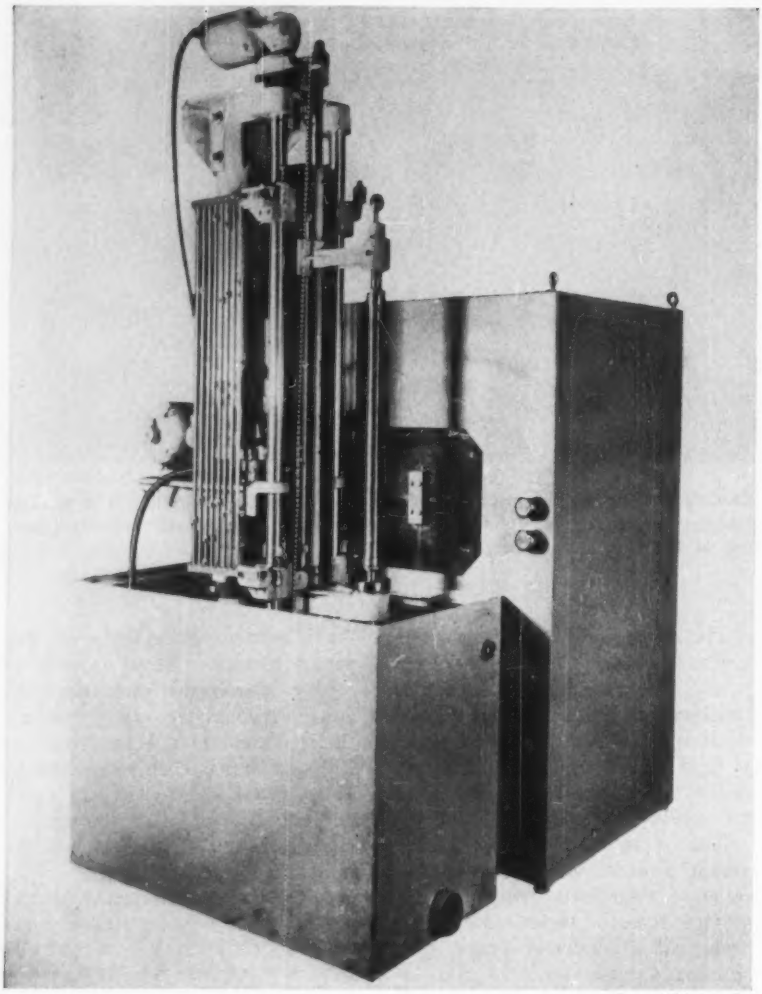
The input feeds a transformer which provides an output on the order of 4000 volts. Applying the voltage across a series circuit consisting of a condenser system, the spark gap, and the work coil induces an oscillating current in this "tank" system when the spark gap passes current. Since a burst of energy is released each time the voltage reaches the value at which the spark develops, there would be 120 such bursts each second on 60 cycle input. Sizes of the condensers and coil in the output circuit determine the frequency of the power in the bursts.

High frequency output on the order of 250,000 cycles and above is commonly obtained with vacuum tube type units. Similar to radio broadcasting stations, they will pro-



Induction Heating Corp.

Another application of induction heating—shrink fitting. Assembly of gears and bearing races requires expansion of outer member for assembly. In this unusual arrangement, a special iron core transformer is used, with the work acting as the secondary. To extract the heated part, the upper portion of the transformer swings up and back



General Electric Co.

Progressive hardening can be done by moving the coil or the shaft. This machine can harden selected areas rather than the entire shaft, and the rate of travel of the heated zone can be varied

vide a continuous power source, rather than the series of bursts characteristic of the spark-gap units. The tubes replace the spark gap as the switch which controls the flow of energy. Output is usually 50 kw or less in single cabinet units, but units several times that size have been constructed.

Mercury vapor or mercury arc tubes for the conversion of power line frequencies to higher values have been used to some extent, but the time required for the tube to deionize so that the cycle can be repeated limits the available frequencies to about 1000 cycles.

• **Melting**—Induction melting, the first practical application of the method, is still widely used and is getting an added boost in the production of vacuum induction melted alloys. Core type units, in which the molten metal moves through the primary coil, are in wide use in the nonferrous field; they provide molten metal for diecasting machines.

In core type units, a loop of molten metal forms the shorted secondary of the transformer system. It is often small compared with the main metal pool, but the motor effect causes a stirring of the melt which aids in maintaining uniformity. A magnetic iron core is normally used to concentrate the flux linkage.

Several types of coreless induction furnaces are available. In them, the primary coils surround a refractory container holding the melt. It is not necessary to have molten metal present to start the furnace, and the refractory construction is simplified. In many cases, the frequency is higher than line, and motor-generator sets are common for large installations — spark gap converters for lower power requirements.

An unusual type of melting requirement is the tin reflow operation on electrolytic tin plate lines. The tin, as plated, is a soft gray. To brighten and smooth the plate, the tin layer is melted as the plated metal moves to the coilers at the rate of a mile every couple of minutes. Powerful high frequency generators have been used to melt the metal on the fly; the metal passes through the coils in a fraction of a second as it leaves the plater and travels down to the coilers.

• **Heating for Forming**—A number of large installations have been used to heat metals for forging, extrusion, or rolling. Here, the value of the induction units lies in their ability to bring the billets to heat thoroughly and rapidly. This reduces the tendency for scale formation and cuts the quantity of work held in the heating areas compared with less rapid processes.

The problem of depth of current penetration is most important here. So the frequency of the installation is varied with the diameter of the work to be processed. A rule of thumb:

1000 cycles	2 to 6	in. diam
3000 cycles	1 to 3	in. diam
10,000 cycles	½ to 1½	in. diam

In heating magnetic materials, dual frequency installations may improve efficiency. Initial heating is done with low—sometimes line—frequency; higher frequency is applied after the work has reached a temperature where it is no longer magnetic. Large billets can be heated with 60 cycle units alone.

Generation of the heat in the billet itself reduces temperatures in the working area, cuts floor space, and simplifies startups and shutdowns. It is possible to design coils which will provide a nonuniform heat pattern in the billet. And installations are easily automated.

• **Heat Treatment**—Use of high frequency heating to produce a hardened case on steel parts is a well known use of induction heat-

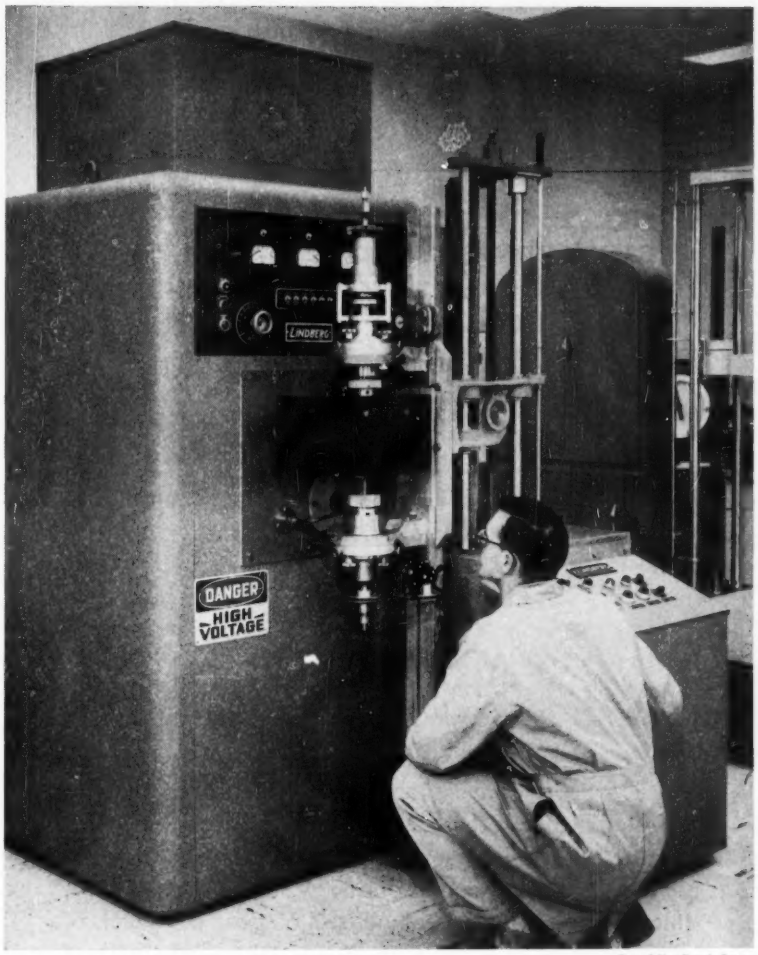
ing. Less common, but growing in importance, is the possibility of complete heat treating while the material is on the move. A bar, for example, can be heated, quenched, and reheated for tempering as it moves along the processing line. Another use is the local annealing of hardened steel parts, where they must be drilled after hardening.

Relatively small heating units can sometimes be employed for large jobs by progressive heating. It is practice to harden the teeth of a large gear one at a time. The short heating cycle does not permit enough heat transfer to soften the adjacent tooth as the next one is being heated. The rapid heating required necessitates high power density, obtained by concentrating the output of the generator on the individual teeth. The same principle is used in many other ways—for bearing surfaces, wrench jaws, lawn mower bed knives, lathe beds, and other parts.

Heating time is so short that scale is not a problem, in spite of the lack of a protective atmosphere. But the short heating cycle may pose problems where carbides are spheroidal, hence take time to go into solution.

• **Joining**—It has been estimated that some 35 per cent of the electronic heaters sold are used for joining operations, in addition to the motor-generator sets used for this purpose. Soldering, welding, and brazing are carried out with these installations. Induction puts the heat where it is needed, without softening other areas of the work.

An interesting application of induction heating in the electrical industry: The joining of multistrand wire. Where the wire has been cut and stripped of its insulation, it may tend to fray and will then require twisting before an electrical connection can be made. If the wire has been lightly tinned, which is the practice to facilitate solder connections, an induction heater can be used to heat the wire so that the solder joins the strands. The insulation does not interfere with the heating, since it is a nonconductor. If desired, heating may be carried to the point where the bond of the insulation is weakened, making stripping easier.



Republic Steel Corp.

Floating zone melting is similar to progressive hardening, but control must be even closer. Here the vertical bar assembly moves through a stationary coil. Lower portion of the bar can be rotated for greater uniformity

• **Heating in Enclosed Areas**—Because induction heating can be done without direct contact, heating inside closed containers is possible if they are insulators and do not shield the metal to be heated. There are a number of industrial applications of this principle. Vacuum tubes, for example, will not operate well if they contain gases, yet the metal parts of the tube will hold certain gases tenaciously unless heated. If the tube is placed in a suitable induction heating unit, while still being evacuated, the adsorbed gases can be dislodged and the pump will take them out. It is also usual to include a small strip of metallic magnesium in the tube. After sealing, the tube is again placed in an induction coil and the magnesium is vaporized. That removes any last traces of oxygen, which could shorten service life.

Use of induction melting is common in the production of ultra-high-purity metals, needed in such developments as transistors. Use in such processes as zone refining is based on the principles of solutions and phase diagrams. Details and calculations may be complex, but an idea of the operation may be gained by referring to an old principle: A small addition of alcohol lowers the freezing point of water. As freezing commences, the first crystals to separate from the solution are nearly pure water. So the alcohol is concentrated, and the freezing point of the remaining mixture is lowered. The last amount to freeze will have much more alcohol, percentagewise, than the original mixture. (Years ago farm-

Interstate Gets a Higher Quality Finish and Paint Mileage is More Than Doubled with

RANSBURG

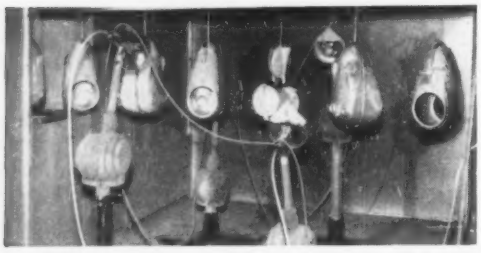
NO. 2 PROCESS ELECTROSTATIC SPRAY PAINTING

in finishing

COMPACT VACUUM CLEANERS

Interstate Engineering Corporation in Anaheim, Calif. switched from hand spray to Ransburg automatic Electro-Spray in the painting of their quality line of home renovating products: The COMPACT vacuum cleaner . . . the POLISH-AIRE floor polisher . . . and MAGIC DISC carpet and rug sweeper.

RESULTS? Quality of the painting improved, for with former hand spray, rejects used to run as high as 10%. That's because of Interstate's high quality standards. Now, with Electro-Spray, rejects are cut to less than 2%! This alone would have justified the change, but Ransburg Electro-Spray also provides substantial labor and material savings. One operator now does the work of two. And, with the former method, Interstate was painting only 28 sets of parts per gallon of paint. Now, they get 57 sets of parts per gallon. Think of what 50% savings would mean in YOUR finishing department.



Vacuum cleaner parts are painted with wrinkle enamel as they pass through the electrostatic spray painting area in the finishing department at Interstate Engineering Corp. Unpainted parts, entering from the right, are coated uniformly by the two Ransburg atomizing bells on either side of the line.

NO REASON WHY YOU CAN'T DO IT, TOO!

Let us show YOU and test-prove the advantages of automatic electrostatic spray painting on YOUR products in our complete laboratories. Call or write for our No. 2 Process brochure which shows a variety of automatic painting installations on a wide variety of products in both large and small plants. Or, if your production doesn't justify automatic painting, let us tell you about the new No. 2 Process Electrostatic Hand Gun which can be used in either conveyorized, or non-conveyorized painting.

RANSBURG

RANSBURG
Electro-Coating Corp.
Box-23122, Indianapolis 23, Indiana

ers used the process when they put a barrel of hard cider out on the back porch during freezing weather. The last small amount, which didn't freeze, was applejack and had a well deserved reputation.)

Using the same principle, a molten zone (hence the term zone melting) is created by an induction coil. As the zone moves through the metal, materials tending to lower the freezing point will concentrate in the liquid area and are therefore swept to the end. The process may be repeated for additional purification. If the impurities tend to raise the freezing point, they concentrate at the starting end.

A further refinement, floating zone melting, is still trickier. One of the potential sources of contamination in melting is the container or crucible in which the metal is held. Reactive metals, particularly, can pick up undesirable contamination from this source.

Floating zone melting eliminates the problem by eliminating the container. The rod of metal is supported vertically, and carefully controlled induction heating is applied to a small section. It melts, but the molten zone is kept small enough so that surface tension holds it in place. By extremely careful control of the power input, the molten zone can be moved up the length of the metal, and so zone purification can take place without any crucible or refractory container. By surrounding the metal with a suitable insulating tube, controlled atmosphere or vacuum may be used.

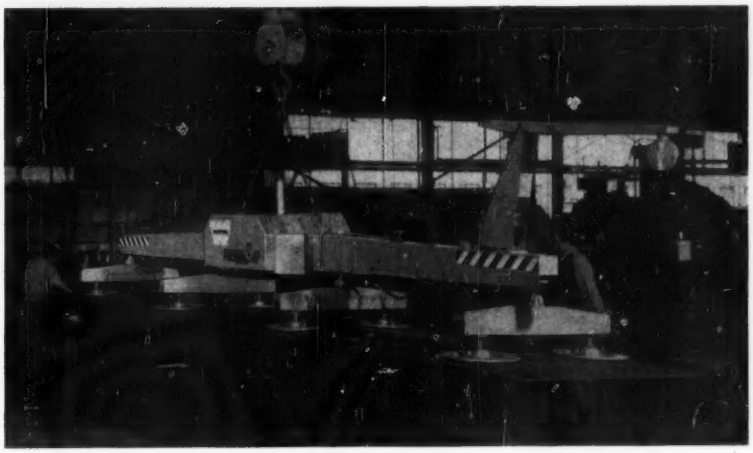
No longer simply a laboratory curiosity, zone refining methods have been used for commercial purification where ultrapure metals have been required.

• **Drying**—A more prosaic process, drying, has also felt the impact of induction heating methods. Here the interest is in continuous processing. Drying may be of water, for example after cleaning, or of paint in continuous lines. Heating the metal under the paint, rather than the paint itself, helps to evaporate the lower layers of solvent. Equipment makers are on the lookout for such jobs, where rapid and controlled heating may save time or space.

Vacuum Grippers Lift Rough, Smooth Surfaced Parts

SAVINGS in material handling are possible with a new vacuum lifting system called Pressuregrip. It can be used for general purpose work with a crane or it can be designed to perform automatic or semiautomatic material handling operations, says the company.

The system uses a Vac-Pac motor and pump unit and a vacuum gripper. A multiseal gripper gasket can pick up rough textures (concrete and diamond tread plate) with complete safety. Systems of multiple grippers can lift bulky sheets too thin to support their own weight. Narrow grippers permit the handling of rails, beams, and pipe.



Grippers are available up to 25 in. in diameter with lifting capacities up to 2000 lb per gripper. There is no limit to the number of grippers which can be used to obtain required capacity.

For more information, *write* Whiting Corp., 157th Street and Lathrop Avenue, Harvey, Ill.

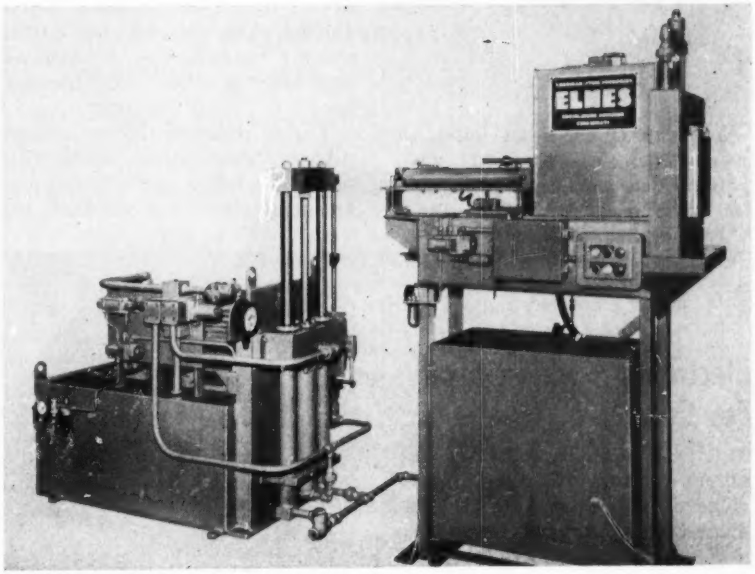
Separate Billet Descaler, Power Unit Saves Space

THIS billet descaler minimizes floor space requirements since the water power unit can be mounted remotely from the descaling cabinet.

The power unit has stainless steel rams and bronze trimming. It's fastened to the hydraulic unit in a vertical position to reduce floor space requirements.

The cabinet has an adjustable billet ejection speed. Different billet sizes and shapes can be handled by the ejection, chamber. The descaling spray can do both ends of the billet during ejection.

The scale basket can be removed readily with a fork truck, or the complete descaling unit can be picked up by the truck and moved to another location. Billet sizes range from 3 to 5 in. rounds, 3 to 10 in. long, and 2¼ to 7 in. round

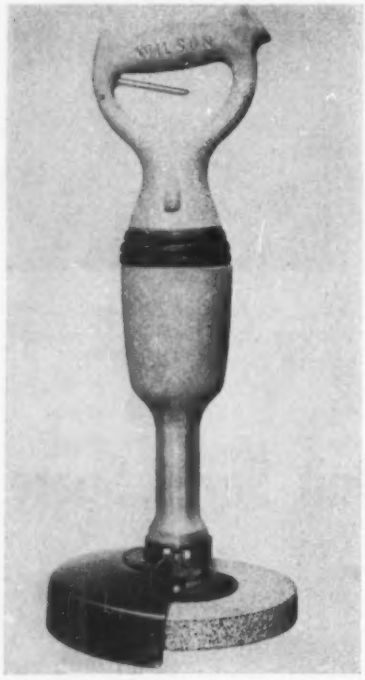


cornered squares 5 to 8 in. long.

For further information, *write* Elmes Engineering Div., American Steel Foundries, 1150-X Tennessee Ave., Cincinnati 29, Ohio.

Pneumatic Grinder Handles 8 in. Wheels

A PORTABLE pneumatic grinder has been added to the Wilson line. The new 905 series consists of heavy duty horizontal grinders, wire brushing machines, and horizontal buffers suitable for up to 8 in. wheels.

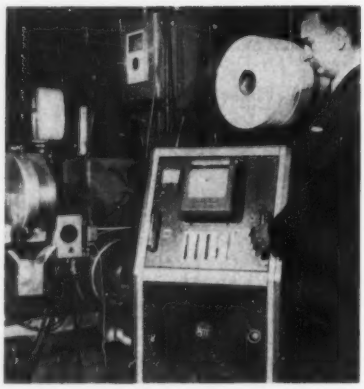


You can choose from four free speeds from 3100 to 6000 rpm. Straight, lever, or grip-type handles can be specified.

For further information, *write* Thomas C. Wilson Inc., 22-12 44th Ave., Long Island City 1, N. Y.

Electronic Machine Used For Control of Quality

YOU can inspect production line output electronically with a machine developed by American Machine & Foundry Co. The portable device checks production line stand-



ards and quality control using the standard deviation method of measurement.

The instrument counts, weighs, computes, and records the standard deviation of each item on the line. The procedure is done in about one-hundredth the time required by manual methods.

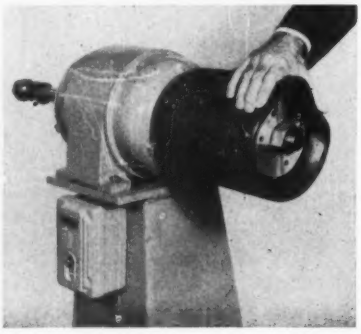
The output of the machine can be presented on a meter scale, recorded on a chart, or printed in digital form on a paper tape. The unit operates from standard electrical service and can be installed quickly by plant personnel at any point along a production line.

For further information, *write* American Machine & Foundry Co., AMF Bldg., 261 Madison Ave., New York 16, N. Y.

Inflated Sanding Drum Follows Work Contours

AN INFLATED sanding drum (Model 890 Valcore) for coated abrasive bands is 8 in. in diameter and takes a 9 in. wide abrasive band.

The resilience of the air inflated rubber contact drum allows the abrasive to follow contours and present more abrasive to the work. No



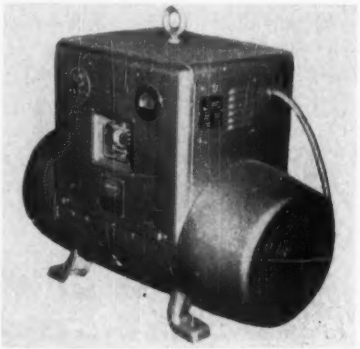
part of the core or side plates extends above the abrasive to restrict the working area across the abrasive surface. The company says that these features result in higher production per hour both on flat and contoured surfaces.

The drum requires no adhesive or sealant to fasten the drum to the core. All parts are replaceable. Standard bore size is $1\frac{1}{4}$ in. Larger sizes are available.

For further information, *write* Nu-Matic Grinders Inc., 8224 Carnegie Ave., Cleveland 3, Ohio.

Single Circuit Charger Handles Truck Batteries

THREE single circuit chargers for high ampere hour capacity batteries are rated at $7\frac{1}{2}$, 10, and 15 kilowatts. Each is an integral, automatic unit designed for lead-acid or nickel-iron-alkaline industrial truck batteries.

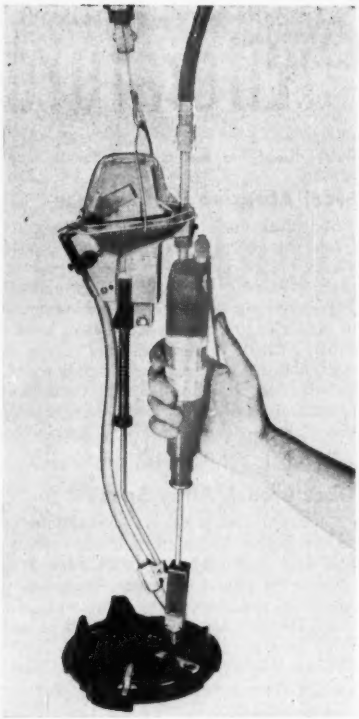


A heavy duty Hobart dc line contactor provides reverse current production to the battery and generator. An across the line motor starter provides thermal overload control, undervoltage, and phase failure protection to the motor. The unit has easy changeover from 220 to 440 volts.

For further information, *write* Motor Generator Corp., W. Water Street, Troy, Ohio.

Manual Screw Placement Eliminated by Machine

AN AUTOMATIC screw feeder made by Wales-Strippit can be used with pneumatic and electrical tools to feed and position screw fasteners. It's designed for vertical screw driv-



ing operations and eliminates manual screw placement. It's set at the factory to drive specific screw types.

The unit has a screw holding hopper and an elevator that picks up the screws and feeds them (one at a time) through a plastic tube with each driving stroke of the tool. As the screw is set under the driving blade, a collet holds the screw accurately and firmly in place. The outside of the collet is shaped to find the screw holes and can be modified for use in close quarters.

For further information, *write* Wales Strippit Inc., a unit of Houdaille Industries Inc., 210 Buell Rd., Akron, N. Y.

Ultrasonic Cleaners Use Smaller Generators

GREATER cleaning efficiency is claimed for the Bendix sonic energy cleaning systems. Smaller electronic generators are used.

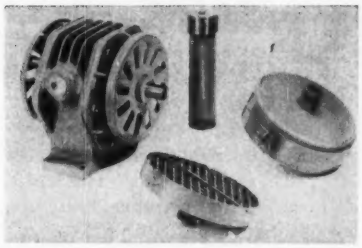
The cleaners have co-ordinated units for rinsing, drying, and filtering which the maker says have greater operating efficiency and freedom from maintenance.

For further information, *write* Pioneer-Central Div., Bendix Aviation Corp., Davenport, Iowa.

Air Pressure or Vacuum Supplied by Rotary Pump

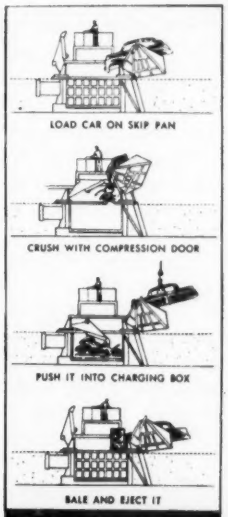
A POSITIVE displacement, dry air pump is capable of supplying pressure or vacuum for processing applications. It requires no lubrication.

The cast iron unit consists of a body, left and right parts, and a rotor. Close machining tolerances have eliminated seals and gaskets. The body and plates are joined with ground finishes.



Three pump sizes are available ranging from 3.9 to 32.2 cfm (60 cfm with modifications). You can get single or double shaft extensions

New Power Packed "750 CS" Bales Car Bodies in Just 3 Minutes



LOW-INVESTMENT BALESTER DOES WORK OF BIGGER PRESSES

In a feast-or-famine market, versatile equipment pays off! That's the reason for the new 750-CS which handles smaller scrap with unbeatable efficiency and bales car bodies at a pace only slightly off that of the big expensive presses. The powerful new "Ram-Pan Loader" with the curved bottom fits the arc of the compression door as it pushes the car down into the charging box, a pre-baling operation that takes less than a minute and reduces costly cutting or shearing work. All told, you've got a tight compact bale in *less than three minutes!* You'll like the many other new features of the 750-CS.

Mfd. By DEMPSTER BROTHERS, Inc.

WRITE TODAY FOR NEW BULLETIN ON 750-CS

DEMPSTER BROTHERS, Dept. S-12
Knoxville 17, Tenn.

and clockwise or counterclockwise rotation.

Accessories include a pressure relief valve and air filters (see cut). You can also get intake noise reducers and exhaust mufflers.

For further information, *write* Dri-Air Pump Dept., Conde Milking Machine Co., Sherrill, N. Y.

Ball Comparator Does Fast, Accurate Measuring

WITH the Cleveland Micro-Ac ball comparator, you can measure small lots of balls rapidly and accurately to a fraction of a millionth of an inch. Typical uses are checking of sample lots of production ball runs or matching sets for diameter and random sphericity. The fixture can be adjusted from one ball size to another in 1 minute or less.

The basic unit consists of the Cleveland Miro-Ac gage block comparator and a special fixture with several interchangeable slide inserts.

For further information, *write* Cleveland Instrument Co., 6220 Schaaf Rd., Cleveland 31, Ohio.

Air Control Valve Can Be Repacked in 1 Minute

THE PDQ air control valve (including plug-in solenoid) can be replaced in less than 30 seconds. It is removed by loosening two cap screws, twisting the pilot cap, and removing the pilot cap and valve housing.

It has two replacement parts (the

poppet spindle-sleeve assembly and the solenoid pilot assembly). Repacking requires no tools and takes less than 1 minute. Weight is 4 lb. The valve will flow 335 cfm with 100 psig initial pressure to atmosphere.

A short-stroke pilot quickly actuates a compact, full-orifice poppet spindle. Response time to fill a 140 cu in. vessel to 90 psig with an initial pressure source of 100 psig is 113 seconds (6.8 electrical cycles). It takes 0.195 second (11.7 electrical cycles) to exhaust the vessel from 90 to 10 psig. It's available in tap sizes of $\frac{3}{8}$, $\frac{1}{2}$, and $\frac{3}{4}$ in.

For further information, *write* Hunt Valve Co., Salem, Ohio.

Stainless Powder Forms Corrosion Resistant Parts

A FLOWABLE, stainless steel powder mix for producing corrosion resistant machine components and equipment is available in semi-commercial quantities. Parts fabricated from the material have about the same resistance to corrosion as cast and wrought stainless material, and they can be produced without expensive machining.

The company says structural shapes exceed 95 per cent of theoretical density, providing excellent corrosion resistance for gears, bushings, and valves.

Composition is similar to Type 316 or CF-Mo alloys. Compacted shapes have excellent green strength and can be handled easily.

For further information, *write* Union Carbide Metals Co., a division of Union Carbide Corp., 30 E. 42nd St., New York 17, N. Y.

NEW literature

Write directly to the company for a copy

Steel Abrasive Performance

Statistical and performance data compiled from abrasive research and experimentation are discussed in a "Handbook of Blast Cleaning Abrasive Performance." Topics include performance and economy in blast cleaning abrasives, abrasive breakdown related to finishes and cleaning costs, abrasive hardness and cleaning speed, abrasive size and finish quality, and how to control finish in airless blast cleaning. Wheelabrator Corp., 1157 S. Byrkit St., Mishawaka, Ind.

Cast Bronze Alloy Specs

Chemical and physical specifications of 29 cast bronze alloys (used in sleeve bearings and bushings) are listed in a brochure. A chart indicates compressive strengths and how they vary with the thickness of the metal. Military and other similar specifications are also listed. Renewal Service Inc., 17th Street and Lehigh Avenue, Philadelphia 32, Pa.

Resin, Bonding Agent Selector

Bulletin 121 contains selector charts for potting compounds, coatings, foams, and bonding agents. Definitions are provided for such terms as casting, encapsulation, impregnation, and coating. Charts offer hard, semirigid, and flexible formulations for each application. A similar breakdown is given for foams. Plastic Associates, 185 Mountain Rd., Laguna Beach, Calif.

Flame Plating Data

A bulletin explains how the process heats metal particles to a plastic state, then blasts them on as coatings. General properties are discussed, and tables of physical data are provided for coating materials most often used (including tungsten carbide and aluminum oxide). Linde Co., a division of Union Carbide Corp., 30 E. 42nd St., New York 17, N. Y.

Hydraulic Cylinder Selection

Engineering Guide No. 117 describes a line of interchangeable high pressure hydraulic cylinders. It also presents hydraulic pressure and flow data, a simplified explanation for calculating forces required for acceleration and deceleration, and a table to determine oversized rod and stop tube applications. S-P Mfg. Corp., 30201 Aurora Rd., Cleveland 39, Ohio.

Power Drive Calculator

A calculator slide rule for computing the proper roller chain for every type of drive covers all factors. The slide rule was developed to supply design engineers and others responsible for specifying power drives with all necessary data for roller chain and sprocket selection. Dept. C, Atlas Chain & Mfg. Co., West Pittston, Pa.

Not Much 'Water' in Order Books

STEELMAKERS expect to lose some of the tonnage they've booked if a new labor contract is signed before the injunction expires, but the losses will probably be negligible.

As long as the automotive industry continues to press for shipments, the mills will have to quote extended deliveries—particularly on flat rolled products. And as long as deliveries remain extended, consumers won't risk drastic curtailment of their orders. They'll continue to make vague commitments for future tonnage, filling in the specifications more precisely as their needs become more apparent.

DUPLICATE ORDERS— Although some buyers have undoubtedly placed duplicate orders in an effort to assure themselves of deliveries before Jan. 26, steelmakers aren't worried. Typical comment from one producer: "Some of the tonnage we've taken might be canceled or held up if there's an unexpected break in the labor situation, but most of the business is from old standbys. All we would expect to lose would be the tonnage placed by a few nonregular buyers. And if they cancel, we'll have no trouble finding a home for what they ordered."

STRETCHOUT LATER?—Because inventories of users are low and unbalanced, they will take all the tonnage they can get in the immediate future —strike threat or not. Once their urgent requirements are satisfied and they're assured of uninterrupted steel production, they may scale down second quarter commitments, or ask that tonnage for delivery in one month be spread over two.

SHEETS ALLOCATED—Cold rolled and galvanized sheets are still heading the list of critically needed products. Leading producers say they can't take any additional tonnage for the first half of next year. All suppliers are allocating shipments on the basis of past buying patterns. Methods include: 1. Totaling a customer's purchases for a certain period, figuring a monthly average, and trying to ship him that much steel per month. 2. Determining what percentage of total output a customer has purchased over a long period and allowing him that percentage of current monthly production. 3. Shipping a customer a monthly quota equivalent to a certain percentage of what he bought per month during the first half.

TUBEMAKERS TIGHTEN CREDIT—Eastern oil country goods makers are tightening credit to distributors and ending freight allowances that made them competitive with mills in Texas and Colorado. During February and March, they'll rescind 120 and 90 day terms and revert to "regular" policy—2 per cent, 40 days. During the recession, they agreed to absorb distributors freight costs that were in excess of 4 per cent of the value of steel shipped to customers.

The distributors will continue to get a 6 per cent discount on mill prices. Since credit will now be tighter, they'll probably have to carry smaller inventories and rely more heavily on downriver stocks maintained by the mills.

HOLIDAY CUTS OUTPUT— Last week, steelmakers operated their furnaces at 93.5 per cent of capacity, 2.8 points below the previous week's revised rate. Production was about 2,647,000 ingot tons. Even though they had to pay a 125 per cent premium for holiday employment, the companies offered work to anyone who wanted it.

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*Current prices were published in the Dec. 21 issue and will appear in subsequent issues.

Bar Shipments Heading for New Peak

RECORD demand for hot rolled merchant and cold finished steel bars (all grades: carbon, alloy, stainless) is in prospect for 1960. With inventories depleted and most manufacturing industries scheduling higher operations, the mills will be under heavy pressure for deliveries throughout the year.

Assuming there's no protracted work stoppage in steel, market authorities think shipments of hot rolled and cold finished bars will exceed 11.6 million net tons, shading the record (11.5 million tons set in 1953) by a substantial margin (see table).

Hot rolled will account for 9.5 per cent of steel product shipments during the year, cold finished around 1.8 per cent.

• Despite the long steel strike, bar shipments in 1959 exceeded last year's.

The year's movement is estimated at 8.2 million tons vs. 6,669,980 during recession-troubled 1958. Cold finished bars were not as adversely affected as hot bars during the strike because many converters continued to operate—they accumulated large stocks of hot bars earlier in the year. As a result, the ratio of cold finished shipments to hot rolled shipments was a little higher than in most other years.

Steel bars are used in more metalworking industries than any other steel product. The peak production year for merchant bars (including light shapes) was 1953 when 12,155,006 tons were rolled. Second best: In 1943 output was 12,089,609 tons. During the war, consumption approached 14 per cent of mill shipments of all steel products.

• All large consuming outlets are expected to substantially increase their use of bars, both hot rolled and cold finished, during 1960.

The automotive industry is the largest outlet. Last year it took an estimated 2 million tons of hot rolled and over 300,000 tons of cold finished.

Shipments of Carbon, Alloy, Stainless Bars

(Net tons)

Years	Hot Rolled†	Cold Finished	Totals
**1960	9,686,430	1,950,682	11,637,112
*1959	6,892,357	1,388,010	8,280,367
1958	5,646,563	1,023,417	6,669,980
1957	7,567,400	1,319,288	8,886,688
1956	8,840,349	1,736,369	10,576,718
1955	8,798,261	1,877,961	10,676,222
1954	6,255,465	1,210,273	7,465,738
1953	9,323,429	2,194,375	11,517,804
1952	8,111,683	1,922,205	10,033,888
1951	8,930,633	1,935,823	10,866,456
1950	8,017,465	1,624,845	9,642,310

*Based on the percentage pattern in the first seven months.
**Projected on the percentage pattern in the first seven months of 1959.
†Includes light shapes.

Automotive consumption should easily top those figures next year. Passenger car output is expected to range around 7 million units compared with 5.8 million this year. It's roughly estimated that each car uses close to 600 lb of bars, 500 being hot rolled (mostly for axles and suspension) and 100 cold drawn (in transmissions and engines). Lighter cars may reduce use per unit slightly, but the shrinkage will be more than offset by larger total output.

Other big bar consuming industries are: Forgings (other than automotive); bolts and heavy fasteners; agricultural equipment; industrial and electrical machinery; rail transportation. There are about a dozen smaller consuming industries and all will likely use heavier tonnage next year.

• Steel service centers may get larger tonnages because they must rebuild their strike depleted inventories of hot rolled and cold drawn bars.

The industrial machinery and tool classification ranks second to the automotive industry as a market. In 1959, some 750,000 tons of hot rolled and 300,000 tons of cold finished went to that industry. Those tonnages will be bettered in 1960.

Also, the agricultural implement industry's take of more than 335,000 tons of hot rolled and 65,000 tons of cold drawn in 1959 will be topped. Nearly half the steel in a 1500 lb, medium size, general purpose farm tractor consists of bars.

Steel Bars . . .

Bar Prices, Page 97

Substantial tonnages of hot bars are being received from the mills by the producers of cold finished bars,

but some buyers allege that suppliers are shipping an abnormally large amount of their tonnage to automotive customers.

In any case, the hot mills recently reduced their first quarter allocations to customers, and they're promising May and June shipments on new orders. On a few sizes they can give early April delivery.

Alloy bars aren't as hard to get as the carbon grade. However, supplies have tightened up noticeably in recent weeks.

Nonintegrated producers of cold finished bars say April is the best delivery they can give on new orders.

Severe Price Cutting on Imported Steel Expected

Market observers at Houston think a settlement of the steel industry's labor dispute will touch off severe price cutting on broker stockpiled foreign steel in the area. For the moment prices are steady.

Estimates vary as to how much foreign steel is still piled in the district. Brokers are thought to be still holding around 50,000 tons.

The foreign mills have not changed their prices. On the average, imported steel ordered directly from the mills costs from $12 to $15 a ton less than is charged for domestic tonnage. There are some exceptions, some foreign products being priced above U. S. quotations.

Imported steel unloaded in Chicago during October amounted to 28,290 tons, up 52 per cent over September's 18,573 tons. August's total was 27,803, July's 37,459, and June's 35,635.

October imports at Chicago were: 31 per cent structural items, 27 per cent wire rods, 20 per cent plates, 11 per cent bars, 7 per cent wire and wire products, the remainder being rails, sheets, pipe and tubing, and barbed wire.

The originating countries were: 84 per cent from Belgium, principally Antwerp; 6 per cent from the Netherlands, principally Rotterdam; 4 per cent from France, 3 per cent from Germany. Great Britain, Italy, and Sweden contributed smaller amounts.

Tubular Goods . . .

Tubular Goods Prices, Page 101

Tubemakers expect to produce oil country goods at capacity during the first half of 1960. "After we take care of our customers, we'll start to rebuild our own in transit stocks," a sales executive of one producing company said last week. "Our downriver inventories are about gone. We're paying for space, but we don't have any tonnage to lay down."

Sales officials of another company say they'll be current on oil country goods by Mar. 15. Then they'll start shipping to downriver terminals. "We'll need about 60 days to bring our terminal stocks up to par," one executive estimated.

Because small sizes of seamless standard pipe are made on oil country goods mills, one Pittsburgh area producer can't promise delivery of new orders before June.

Although it has a full rolling schedule for the first half of next year, a leading producer of line pipe can take additional tonnage. A company spokesman said: "We're on 20 in. pipe right now, and we'll stay on it through January. Demand is fairly good, but we're looking for more business. Reason: It takes a lot of tonnage to keep the big mills going."

Oil well drilling was stepped up in the week ended Dec. 14. The Hughes Tool Co.'s survey showed a 14-rig increase over the preceding week with 2181 rotary rigs operating. That total was 140 below the count for the comparable week a year ago.

Plates . . .

Plate Prices, Page 97

Some of the leading producers of sheared plates are booked into May. They could accept tonnage for shipment beyond that month. Certain other mills are not making commitments that far ahead and probably will not until they are certain about future operating schedules.

Demand for plate specialities is featured by requirements for the chemical industry.

Shipwork is more promising with the award of four high speed, mariner type cargo ships to the Newport News Shipbuilding & Dry Dock Co., Newport News, Va. The ships are for the States Steamship Co., a West Coast firm, and will cost about $11,134,835 each.

DISTRICT INGOT RATES

(Percentage of capacity engaged)

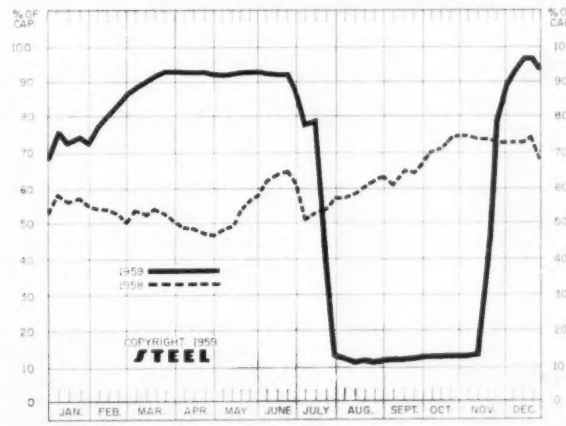
	Week Ended Dec. 27	Change	Same Week 1958	Same Week 1957
Pittsburgh	95.5	— 1.5*	62	47.5
Chicago	96	— 0.5*	86.5	75
Eastern	92	— 4	57	80.5
Youngstown	99	0	50	35
Wheeling	94	— 1	71	49
Cleveland	95	— 5*	69.3	51
Buffalo	107.5	+ 2.5	66	61
Birmingham	89.5	+ 3	71.5	72.5
Cincinnati	91	— 5.5*	89	60
St. Louis	91.5	—17*	73	51
Detroit	93.5	— 5*	89	51
Western	89	— 6	79	77
National Rate	93.5	— 2.8*	68.2	53.4

INGOT PRODUCTION

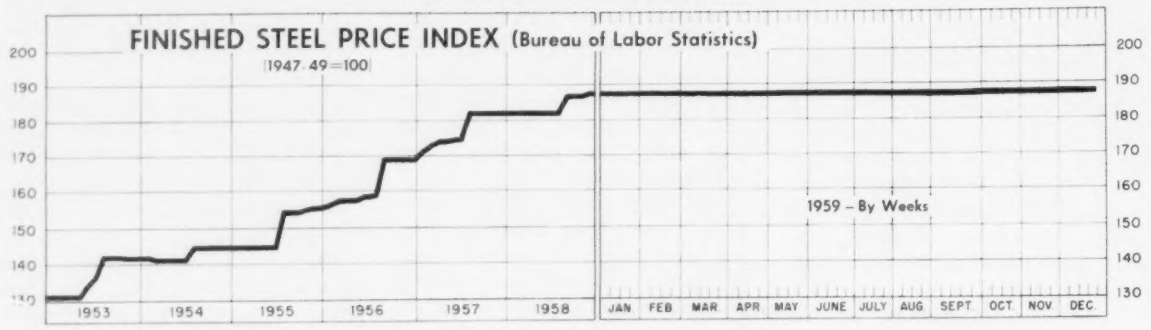
	Week Ended Dec. 27	Week Ago	Month Ago	Year Ago
INDEX (1947-49=100)	164.8†	169.7	158.1	114.5
NET TONS (In thousands)	2,647†	2,726	2,540	1,840

*Change from preceding week's revised rate.
†Estimated by STEEL; comparative figures reported by AISI.
Weekly capacity (net tons): 2,831,331 in 1959; 2,699,173 in 1958; 2,559,490 in 1957.

NATIONAL STEELWORKS OPERATIONS



Price Indexes and Composites



Dec. 22, 1959	Week Ago	Month Ago	Nov. Index	Year Ago
186.8	186.8	186.8	186.8	186.9

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Dec. 22

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825
Rails, Light, 40 lb	7.292
Tie Plates	6.875
Axles, Railway	10.175
Wheels, Freight Car, 33 in. (per wheel)	62.000
Plates, Carbon	6.350
Structural Shapes	6.167
Bars, Tool Steel, Carbon (lb)	0.560
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400
Bars, Tool Steel, H.R. Alloy, High Speed, W18, Cr 4, V 1 (lb)	1.895
Bars, H.R., Alloy	10.775
Bars, H.R., Stainless, 303 (lb)	0.543
Bars, H.R., Carbon	6.675
Bars, Reinforcing	6.385
Bars, C.F., Carbon	10.710
Bars, C.F., Alloy	14.125
Bars, C.F., Stainless, 302 (lb)	0.570
Sheets, H.R., Carbon	6.350
Sheets, C.R., Carbon	7.300
Sheets, Galvanized	8.765
Sheets, C.R., Stainless, 302 (lb)	0.658
Sheets, Electrical	12.625
Strip, C.R., Carbon	9.489
Strip, C.R., Stainless, 430 (lb)	0.480
Strip, H.R., Carbon	6.250
Pipe, Black, Buttweld (100 ft)	19.905
Pipe, Galv., Buttweld (100 ft)	23.585
Pipe, Line (100 ft)	199.533
Casing, Oil Well, Carbon (100 ft)	201.080
Casing, Oil Well, Alloy (100 ft)	315.213
Tubes, Boiler (100 ft)	51.200
Tubing, Mechanical, Carbon (100 ft)	27.005
Tubing, Mechanical, Stainless, 304 (100 ft)	205.608
Tin Plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100
Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800
Black Plate, Canmaking Quality (95 lb base box)	7.900
Wire, Drawn, Carbon	10.575
Wire, Drawn, Stainless, 430 (lb)	0.665
Bale Ties (bundles)	7.967
Nails, Wire, 8d Common	9.825
Wire, Barbed (80-rod spool)	8.758
Woven Wire Fence (20-rod roll)	21.793

STEEL's FINISHED PRICE INDEX*

	Dec. 23 1959	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	247.82	247.82	247.82	247.82	194.53
Index in cents per lb	6.713	6.713	6.713	6.713	5.270

STEEL's ARITHMETICAL PRICE COMPOSITES*

Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$117.95
No. 2 Fdry, Pig Iron, GT	66.49	66.49	66.49	66.49	56.54
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	56.04
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	57.27
Steelmaking Scrap, GT	41.33	41.33	43.50	39.67	32.50

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Dec. 23 1959	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	4.30
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	4.30
Bars, H.R., deld., Philadelphia	5.975	5.975	5.975	5.975	4.55
Bars, C.R., Pittsburgh	7.65*	7.65*	7.65*	7.65*	5.40
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	4.25
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	4.25
Shapes, deld., Philadelphia	5.77	5.77	5.77	5.77	4.53
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.225
Plates, Chicago	5.30	5.30	5.30	5.30	4.225
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	4.225
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.225
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	4.225
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.05
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.05
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	4.95
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	4.95
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.10
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	5.45
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.05
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.05
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	5.75
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	5.85
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	5.90
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	5.75
Nails, Wire, Pittsburgh	8.95	8.95	8.95	8.95	6.85
Tin plate (1.50 lb) box, Pitts.	$10.65	$10.65	$10.65	$10.65	$9.05

*Including 0.35c for special quality.

SEMIFINISHED STEEL					
Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$78.00
Wire rods, 7/32-5/8" Pitts.	6.40	6.40	6.40	6.40	4.675

PIG IRON, Gross Ton	Dec. 23 1959	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$57.00
Basic, Valley	66.00	66.00	66.00	66.00	56.00
Basic, deld., Philadelphia	70.41	70.41	70.41	70.41	59.66
No. 2 Fdry, NevilleIsland, Pa.	66.50	66.50	66.50	66.50	56.50
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	56.50
No. 2 Fdry, deld., Phila.	70.91	70.91	70.91	70.91	55.16
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	52.88
No. 2 Fdry (Birm.) deld., Cin.	70.20	70.20	70.20	70.20	60.58
Malleable, Valley	66.50	66.50	66.50	66.50	56.50
Malleable, Chicago	66.50	66.50	66.50	66.50	56.50
Ferromanganese, net ton†	245.00	245.00	245.00	245.00	190.00

†74-76% Mn, Duquesne, Pa.

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pittsburgh	$41.50	$41.50	$41.50	$42.50	$32.50
No. 1 Heavy Melt, E. Pa.	42.00	42.00	45.00	34.00	32.00
No. 1 Heavy Melt, Chicago	40.50	40.50	44.00	42.50	33.00
No. 1 Heavy Melt, Valley	43.50	43.50	43.50	42.50	34.50
No. 1 Heavy Melt, Cleve.	40.50	40.50	40.50	39.00	32.50
No. 1 Heavy Melt, Buffalo	37.50	37.50	39.50	33.50	30.50
Rails, Rerolling, Chicago	61.50	61.50	64.50	62.50	52.50
No. 1 Cast, Chicago	54.50	54.50	57.50	45.50	40.00

COKE, Net Ton					
Beehive, Furn., Connlsvl.	$15.00	$15.00	$15.00	$15.25	$13.75
Beehive, Fdry., Connlsvl.	18.25	18.25	18.25	18.25	16.75
Oven, Fdry., Milwaukee	32.00	32.00	32.00	30.50	25.25

Cleaner, cooler operation . . . less maintenance . . . longer, trouble-free life

HERE'S WHY: Ordinary d-c motor ventilation systems draw air in at the commutator end, contaminate windings by drawing carbon dust from commutator brush wear *into* the machine. In the new Life-Line® "H," this air flow is reversed. Air and carbon dust are expelled at commutator end . . . assuring cleaner, cooler windings . . . longer motor life . . . less maintenance.

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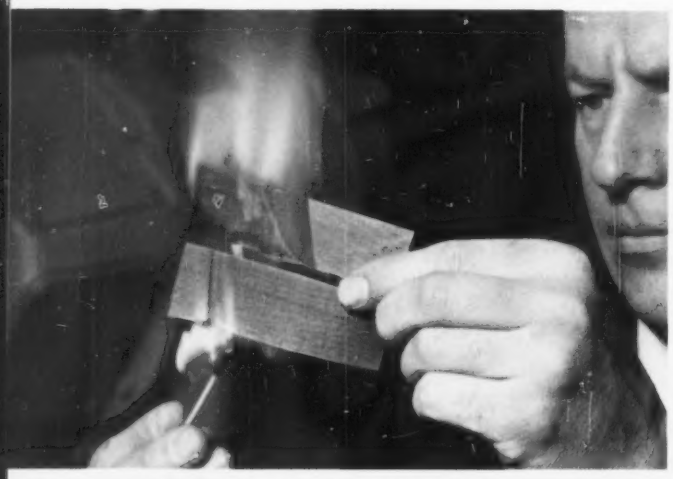
YOU CAN BE SURE...IF IT'S Westinghouse

These exclusive features of the new Westinghouse Life-Line H d-c motor guarantee top performance . . . longer, trouble-free life

TEN TIMES LONGER INSULATION LIFE . . . New silicone insulation in Westinghouse Life-Line* "H" d-c motors and generators stands up under temperatures which turn ordinary insulation to a cinder. High-temperature silicone insulation is used with the full complement of iron and copper required for low Class B temperature. Result: Life-Line "H" shrugs off emergency overloads and abnormal ambients to keep production rolling, maintenance down.

GREATER PROTECTION . . . most complete and advanced protection available in dripproof industrial d-c machines. Elimination of uncovered side openings . . . heavy, cast end brackets . . . effective seals throughout . . . all combine to provide outstanding resistance to liquids, vapors and dirt. This means longer life with greater reliability . . . minimum maintenance under all operating conditions.



FASTEST RESPONSE . . . 35 per cent increase in commutating ability . . . up to 55 per cent lower mechanical inertia . . . and up to 30 per cent reduction in electrical inertia mean that the new Westinghouse Life-Line "H" d-c motor provides the fastest acceleration, quickest reversing and closest speed regulation. This means more production, better product quality, minimum complexity of control.

SIMPLIFIED MAINTENANCE . . . With the new Life-Line "H," maintenance is not only substantially reduced but periodic inspections are also greatly simplified. For example: as shown above, Uniforce brushholder fingers lock out . . . brushes can be inspected or changed with one hand. And Uniforce tension remains constant throughout brush life . . . no need to adjust pressure as brushes wear.

For information about the ways you can profitably put the new Life-Line "H" motor to work, contact your nearby Westinghouse representative. Or, write Westinghouse Electric Corporation, P. O. Box 868, 3 Gateway Center, Pittsburgh 30, Pa. J1-22122

YOU CAN BE SURE...IF IT'S Westinghouse

Steel Prices

Mill prices as reported to STEEL, Dec. 23, cents per pound except as otherwise noted. *Changes shown in italics.* Code number following mill point indicates producing company. Key to producers page 98; footnotes, page 100.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)
Munhall,Pa. U5 .....$76.00

INGOTS, Alloy (NT)
Detroit S41 .....$82.00
Economy,Pa. B14 ....82.00
Farrell,Pa. S3 .....82.00
Lowellville,O. S3 ....82.00
Midland,Pa. C18 ....82.00
Munhall,Pa. U5 .....82.00
Sharon,Pa. S3 .....82.00

BILLETS, BLOOMS & SLABS Carbon, Rerolling (NT)
Bartonville,Ill. K4 ...$82.00
Bessemer,Pa. U5 ....80.00
Buffalo R2 .....80.00
Clairton,Pa. U5 .....80.00
Ensley,Ala. T2 .....80.00
Fairfield,Ala. T2 ....80.00
Fontana,Calif. K1 ....90.50
Gary,Ind. U5 .....80.00
Johnstown,Pa. B2 ....80.00
Lackawanna,N.Y. B2 .80.00
Munhall,Pa. U5 .....80.00
Owensboro,Ky. G8 ....80.00
S.Chicago,Ill. R2, U5 ..80.00
S.Duquesne,Pa. U5 ...80.00
Sterling,Ill. N15 .....80.00
Youngstown R2 .....80.00

Carbon, Forging (NT)
Bessemer,Pa. U5 ....$99.50
Buffalo R2 .....99.50
Canton,O. R2 .....102.00
Clairton,Pa. U5 .....99.50
Conshohocken,Pa. A3 .104.50
Ensley,Ala. T2 .....99.50
Fairfield,Ala. T2 ....99.50
Farrell,Pa. S3 .....99.50
Fontana,Calif. K1 ....109.00
Gary,Ind. U5 .....99.50
Geneva, Utah C11 ....99.50
Houston S5 .....104.50
Johnstown,Pa. B2 ....99.50
Lackawanna,N.Y. B2..99.50
LosAngeles B3 .....109.00
Midland,Pa. C18 ....99.50
Munhall,Pa. U5 .....99.50
Owensboro,Ky. G8 ....99.50
Seattle B3 .....109.00
Sharon,Pa. S3 .....99.50
S.Chicago R2, U5, W14 99.50
S.Duquesne,Pa. U5 ....99.50
S.SanFrancisco B3 ...109.00
Warren,O C17 .....99.50

Alloy, Forging (NT)
Bethlehem,Pa. B2 ..$119.00
Bridgeport,Conn. C32 119.00
Buffalo R2 .....119.00
Canton,O. R2, T7 ....119.00
Conshohocken,Pa. A3..126.00
Detroit S41 .....119.00
Economy,Pa. B14 ....119.00
Farrell,Pa. S3 .....119.00
Fontana,Calif. K1 ....140.00
Gary,Ind. U5 .....119.00
Houston S5 .....124.00
Ind.Harbor,Ind. Y1 ..119.00
Johnstown,Pa. B2 ....119.00
Lackawanna,N.Y. B2..119.00
LosAngeles B3 .....139.00
Lowellville,O. S3 ....119.00
Massillon,O. R2 .....119.00
Midland,Pa. C18 ....119.00
Munhall,Pa. U5 .....119.00
Owensboro,Ky. G8 ....119.00
Sharon,Pa. S3 .....119.00
S.Chicago R2,U5,W14 119.00
S.Duquesne,Pa. U5 ...119.00
Struthers,O. Y1 .....119.00
Warren,O. C17 .....119.00

ROUNDS, SEAMLESS TUBE (NT)
Buffalo R2 .....$122.50
Canton,O. R2 .....125.00
Cleveland R2 .....122.50
Gary,Ind. U5 .....122.50
S.Chicago,Ill. R2, W14 122.50
S.Duquesne,Pa. U5 ..122.50
Warren,O. C17 .....122.50

SKELP
Aliquippa,Pa. J5 .....5.05
Munhall,Pa. U5 .....5.05
Pittsburgh J5 .....5.05
Warren,O. R2 .....5.05
Youngstown R2, U5 ....5.05

WIRE RODS
AlabamaCity, Ala. R2 ..6.40
Aliquippa,Pa. J5 .....6.40
Alton,Ill. L1 .....6.60
Bartonville,Ill. K4 ....6.50
Buffalo W12 .....6.40
Cleveland A7 .....6.40
Donora,Pa. A7 .....6.40
Fairfield,Ala. T2 .....6.40
Houston S5 .....6.65
IndianaHarbor,Ind. Y1..6.40
Johnstown,Pa. B2 ....6.40
Joliet,Ill. A7 .....6.40
KansasCity,Mo. S5 ....6.65
Kokomo,Ind. C16 .....6.50
LosAngeles B3 .....7.20
Minnequa,Colo. C10 ....6.65
Monessen,Pa. P7 .....6.40
Pittsburg,Calif. C11 ....7.20
Portsmouth,O. P12 ....6.40
Roebling,N.J. R5 .....6.50
S.Chicago,Ill. R2, W14..6.40
SparrowsPoint,Md. B2..6.50
Sterling,Ill.(1) N15 ....6.40
Sterling,Ill. N15 .....6.50
Struthers,O. Y1 .....6.40
Worcester,Mass. A7 ....6.70

STRUCTURALS

Carbon Steel Std. Shapes
AlabamaCity,Ala. R2 ..5.50
Aliquippa,Pa. J5 .....5.50
Atlanta A11 .....5.70
Bessemer,Ala. T2 .....5.50
Bethlehem,Pa. B2 .....5.55
Birmingham C15 .....5.50
Clairton,Pa. U5 .....5.50
Fairfield,Ala. T2 .....5.50
Fontana,Calif. K1 .....6.30
Gary,Ind. U5 .....5.50
Geneva,Utah C11 .....5.50
Houston S5 .....5.60
Ind.Harbor,Ind. I-2, Y1.5.50
Johnstown,Pa. B2 .....5.55
Joliet,Ill. P22 .....5.50
KansasCity,Mo. S5 ....5.60
Lackawanna,N.Y. B2 ..5.55
Los Angeles B3 .....6.20
Minnequa,Colo. C10 ....5.80
Munhall,Pa. U5 .....5.50
Niles,Calif. P1 .....6.25
Phoenixville,Pa. P4 ....5.55
Portland,Oreg. O4 ....6.25
Seattle B3 .....6.25
S.Chicago,Ill. U5, W14.5.50
S.SanFrancisco B3 .....6.15
Sterling,Ill. N15 .....5.50
Torrance,Calif. C11 ....6.20
Weirton,W.Va. W6 ....5.50

Wide Flange
Bethlehem,Pa. B2 .....5.55
Clairton,Pa. U5 .....5.50
Fontana,Calif. K1 .....6.45
IndianaHarbor,Ind. I-2..5.50
Lackawanna,N.Y. B2 ..5.55
Munhall,Pa. U5 .....5.50
Phoenixville,Pa. P4 ....5.55
S.Chicago,Ill. U5 .....5.50
Sterling,Ill. N15 .....5.50
Weirton,W.Va. W16 ....5.50

Alloy Std. Shapes
Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....6.90
Munhall,Pa. U5 .....6.80
S.Chicago,Ill. U5, W14..6.80

H.S., L.A., Std. Shapes
Aliquippa,Pa. J5 .....8.05
Bessemer,Ala. T2.....8.05
Bethlehem,Pa. B2 .....8.10
Clairton,Pa. U5 .....8.05
Fairfield,Ala. T2 .....8.05
Fontana,Calif. K1 .....8.85
Gary,Ind. U5 .....8.05
Geneva,Utah C11 .....8.05
Houston S5 .....8.15
Ind.Harbor,Ind. I-2, Y1.8.05
Johnstown,Pa. B2 .....8.10
KansasCity,Mo. S5 ....8.15
Lackawanna,N.Y. B2 ..8.10
LosAngeles B3 .....8.75
Munhall,Pa. U5 .....8.05
Seattle B3 .....8.80
S.Chicago,Ill. U5, W14..8.05
S.SanFrancisco B3 ....8.70
Sterling,Ill. N15 .....7.75
Struthers,O. Y1 .....8.05

H.S., L.A., Wide Flange
Bethlehem,Pa. B2 .....8.10
Ind.Harbor,Ind. I-2 ....8.05
Lackawanna,N.Y. B2 ..8.10
Munhall,Pa. U5 .....8.05
S.Chicago,Ill. U5 .....8.05
Sterling,Ill. N15 .....7.75

PILING

BEARING PILES
Bethlehem,Pa. B2 ....5.55
Ind.Harbor,Ind. I-2 ....5.50
Lackawanna,N.Y. B2 ....5.55
Munhall,Pa. U5 .....5.50
S.Chicago,Ill. I-2, U5 ..5.50

STEEL SHEET PILING
Ind.Harbor,Ind. I-2 ....6.50
Lackawanna,N.Y. B2 ..6.50
Munhall,Pa. U5 .....6.50
S.Chicago,Ill. I-2, U5 ..6.50
Weirton,W.Va. W6 ....6.50

PLATES

PLATES, Carbon Steel
AlabamaCity,Ala. R2 ..5.30
Aliquippa,Pa. J5 .....5.30
Ashland,Ky.(15) A10 ..5.30
Atlanta A11 .....5.50
Bessemer,Ala. T2 .....5.30
Clairton,Pa. U5 .....5.30
Claymont,Del. C22 ....5.30
Cleveland J5, R2 .....5.30
Coatesville,Pa. L7 ....5.30
Conshohocken,Pa. A3 ..5.30
Ecorse,Mich. G5 .....5.30
Fairfield,Ala. T2 .....5.30
Farrell,Pa. S3 .....5.30
Fontana,Calif.(30) K1 ..6.10
Gary,Ind. U5 .....5.30
Geneva,Utah C11 .....5.30
GraniteCity,Ill. G4 ....5.40
Harrisburg,Pa. P4 ....5.30
Houston S5 .....5.40
Ind.Harbor,Ind. I-2, Y1.5.30
Johnstown,Pa. B2 .....5.30
Lackawanna,N.Y. B2 ..5.30
Mansfield,O. E6 .....5.30
Minnequa,Colo. C10 ....6.15
Munhall,Pa. U5 .....5.30
Newport,Ky. A2 .....5.30
Pittsburgh J5 .....5.30
Riverdale,Ill. A1 .....5.30
Seattle B3 .....6.20
Sharon,Pa. S3 .....5.30
S.Chicago,Ill. U5, W14..5.30
SparrowsPoint,Md. B2 ..5.30
Sterling,Ill. N15 .....5.30
Steubenville,O. W10 ....5.30
Warren,O. R2 .....5.30
Youngstown U5, Y1 ....5.30
Youngstown(27) R2 ....5.30

PLATES, Carbon Abras. Resist.
Claymont,Del. C22 ....7.05
Fontana,Calif. K1 ....7.85
Geneva,Utah C11 .....7.05
Houston S5 .....7.15
Johnstown,Pa. B2 .....7.05
SparrowsPoint,Md. B2 ..7.05

PLATES, Wrought Iron
Economy,Pa. B14 ....13.55

PLATES, H.S., L.A.
Aliquippa,Pa. J5 .....7.95
Ashland,Ky. A10 .....7.95
Bessemer,Ala. T2 .....7.95
Clairton,Pa. U5 .....7.95
Claymont,Del. C22 .....7.95
Cleveland J5, R2 .....7.95
Coatesville,Pa. L7 ....7.95
Conshohocken,Pa. A3 ...7.95
Economy,Pa. B14 .....7.95
Ecorse,Mich. G5 .....7.95
Fairfield,Ala. T2 .....7.95
Farrell,Pa. S3 .....7.95
Fontana,Calif.(30) K1 ..8.75
Gary,Ind. U5 .....7.95
Geneva,Utah C11 .....7.95
Houston S5 .....8.05
Ind.Harbor,Ind. I-2, Y1.7.95
Johnstown,Pa. B2 .....7.95
Munhall,Pa. U5 .....7.95
Pittsburgh J5 .....7.95
Seattle B3 .....8.85
Sharon,Pa. S3 .....7.95
S.Chicago,Ill. U5, W14..7.95
SparrowsPoint,Md. B2 ..7.95
Warren,O. R2 .....7.95
Youngstown U5, Y1 ....7.95

PLATES, Alloy
Aliquippa,Pa. J5 .....7.50
Claymont,Del. C22 ....7.50
Coatesville,Pa. L7 ....7.50
Economy,Pa. B14 .....7.50
Farrell,Pa. S3 .....7.50
Fontana,Calif. K1 .....8.30
Gary,Ind. U5 .....7.50
Houston S5 .....7.60
Ind.Harbor,Ind. Y1 ....7.50
Johnstown,Pa. B2 .....7.50
Lowellville,O. S3 .....7.50
Munhall,Pa. U5 .....7.50
Newport,Ky. A2 .....7.50
Pittsburgh J5 .....7.50
Seattle B3 .....8.40
Sharon,Pa. S3 .....7.50
S.Chicago,Ill. U5, W14..7.50
SparrowsPoint,Md. B2 ..7.50
Youngstown Y1 .....7.50

FLOOR PLATES
Cleveland J5 .....6.375
Conshohocken,Pa. A3 ..6.375
Ind.Harbor,Ind. I-2 ..6.375
Munhall,Pa. U5 .....6.375
Pittsburgh J5 .....6.375
S.Chicago,Ill. U5 .....6.375

PLATES, Ingot Iron
Ashland c.l. (15) A10 ..5.55
Ashland l.c.l. (15) A10 .6.05
Cleveland c.l. R2 .....6.05
Warren,O. c.l. R2 ....6.05

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)
Ala.City,Ala.(9) R2 ..5.675
Aliquippa,Pa. (9) J5 ..5.675
Alton,Ill. L1 .....5.875
Atlanta(9) A11 .....5.875
Bessemer,Ala.(9) T2 ..5.675
Birmingham(9) C15 ..5.675
Buffalo(9) R2 .....5.675
Canton,O.(23) R2 .....6.15
Clairton,Pa. (9) U5 ..5.675
Cleveland(9) R2 .....5.675
Ecorse,Mich.(9) G5 ..5.675
Emeryville,Calif. J7 ..6.425
Fairfield,Ala.(9) T2 ..5.675
Fairless,Pa.(9) U5 ....5.825
Fontana,Calif.(9) K1..6.375
Gary,Ind.(9) U5 .....5.675
Houston(9) S5 .....5.925
Ind.Harbor(9) I-2, Y1 5.675
Johnstown,Pa.(9) B2 ..5.675
Joliet,Ill. P2 .....5.675
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ...5.675
LosAngeles(9) B3 ....6.375
Massillon,O.(23) R2 ...6.15
Midland,Pa.(23) C18 ..6.025
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ..6.125
Niles,Calif. P1 .....6.375
Owensboro,Ky.(9) G8..6.025
Pittsburg,Calif.(9) C11.6.375
Pittsburgh(9) J5 .....5.675
Portland,Oreg. O4 ....6.425
Riverdale,Ill.(9) A1 ..5.675
Seattle A24, B3, N14..6.425
S.Ch'c'go(9)R2,U5,W14 5.675
S.Duquesne,Pa.(9) U5..5.675
S.SanFran.,Calif.(9)B3 6.425
Sterling,Ill.(1)(9) N15..5.675
Sterling,Ill.(9) N15 ....5.775
Struthers,O.(9) Y1 ....5.675
Tonawanda,N.Y. B12 ..5.675
Torrance,Calif.(9) C11 .6.375
Warren,O. C17 .....6.052
Youngstown(9) R2,U5..5.675

BARS, Hot-Rolled Alloy
Aliquippa,Pa. J5 .....6.725
Bethlehem,Pa. B2 ....6.725
Bridgeport,Conn. C32 ..6.80
Buffalo R2 .....6.725
Canton,O. R2, T7 ....6.725
Clairton,Pa. U5 .....6.275
Detroit S41 .....6.725
Economy,Pa. B14 .....6.725
Ecorse,Mich. G5 .....6.725
Fairless,Pa. U5 .....6.875
Farrell,Pa. S3 .....6.725
Fontana,Calif. K1 ....7.775
Gary,Ind. U5 .....6.725
Houston S5 .....6.975
Ind.Harbor,Ind. I-2, Y1 6.725
Johnstown,Pa. B2 ....6.725
KansasCity,Mo. S5 ...6.975
Lackawanna,N.Y. B2 ..6.725
LosAngeles B3 .....7.775
Lowellville,O. S3 .....6.725
Massillon,O. R2 .....6.725
Midland,Pa. C18 .....6.725
Owensboro,Ky. G8 ....6.725
Pittsburgh J5 .....6.725
Sharon,Pa. S3 .....6.725
S.Chicago R2, U5, W14 6.725
S.Duquesne,Pa. U5 ....6.725
Struthers,O. Y1 .....6.725
Warren,O. C17 .....6.725
Youngstown U5 .....6.725

BARS & SMALL SHAPES, H.R. High-Strength, Low-Alloy
Aliquippa,Pa. J5 .....8.30
Bessemer,Ala. T2 .....8.30
Bethlehem,Pa. B2 .....8.30
Clairton,Pa. U5 .....8.30
Cleveland R2 .....8.30
Ecorse,Mich. G5 .....8.30
Fairfield,Ala. T2 .....8.30
Fontana,Calif. K1 .....9.00
Gary,Ind. U5 .....8.30
Houston S5 .....8.55
Ind.Harbor,Ind. Y1 ....8.30
Johnstown,Pa. B2 .....8.30
KansasCity,Mo. S5 ....8.55
Lackawanna,N.Y. R2 ..8.30
LosAngeles B3 .....9.00
Pittsburgh J5 .....8.30
Seattle B3 .....9.05
S.Chicago,Ill. R2, W14.8.30
S.Duquesne,Pa. U5 ....8.30
S.SanFrancisco B3 ....9.05
Struthers,O. Y1 .....8.30
Youngstown U5 .....8.30

BAR SIZE ANGLE; H.R. Carbon
Bethlehem,Pa.(9) B2 ..5.825
Houston(9) S5 .....5.925
KansasCity,Mo.(9)S5 ..5.925
Lackawanna(9) B2 ....5.675
Sterling,Ill. N15 .....5.775
Sterling,Ill.(1) N15....5.675
Tonawanda,N.Y. B12 ..5.675

BAR SIZE ANGLES; S. Shapes
Aliquippa,Pa. J5 .....5.675
Atlanta A11 .....5.875
Joliet,Ill. P22 .....5.675
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 ....6.425
SanFrancisco S7 .....6.52
Seattle B3 .....6.425

BAR SHAPES, Hot-Rolled Alloy
Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....7.05
KansasCity,Mo. S5 ....7.05
Pittsburgh J5 .....6.80
Youngstown U5 .....6.80

BARS, C.F. Leaded (Including leaded extra) Carbon
LosAngeles P2, S30 ..11.75*

Alloy
Ambridge,Pa. W18 ..10.175
BeaverFalls,Pa. M12..10.175
Camden,N.J. P13 ....10.35
Chicago W18 .....10.175
Elyria,O. W8 .....10.175
Monaca,Pa. S17 ....10.175
Newark,N.J. W18 ....10.35
SpringCity,Pa. K3 ...10.35

*Grade A; add 0.05c for Grade B.

BARS, Cold-Finished Carbon
Ambridge,Pa. W18 ....7.65
BeaverFalls,Pa. M12,R2 7.65
Birmingham C15 .....8.25
Buffalo B5 .....7.70
Camden,N.J. P13 .....8.10
Carnegie,Pa. C12 .....7.65
Chicago W18 .....7.65
Cleveland A7, C20 ....7.65
Detroit B5, P17 .....7.85
Detroit S41 .....7.65
Donora,Pa. A7 .....7.65
Elyria,O. W8 .....7.65
FranklinPark,Ill. N5 ...7.65
Gary,Ind. R2 .....7.65
GreenBay,Wis. F7 .....7.65
Hammond,Ind. J5, L2..7.65
Hartford,Conn. R2 ....8.15
Harvey,Ill. B5 .....7.65
LosAngeles(49) 390 ....9.10
LosAngeles(49) P4, R2 9.10
Mansfield,Mass. B5 ....8.20
Massillon,O. R2, R8 ...7.65
Midland,Pa. C18 .....7.65
Monaca,Pa. S17 .....7.65
Newark,N.J. W18 .....8.10
NewCastle,Pa.(17) B4 ..7.65
Pittsburgh J5 .....7.65
Plymouth,Mich. P5 ....7.90
Putnam,Conn. W18 ....8.20
Readville,Mass. C14 ....8.20
S.Chicago,Ill. W14 ....7.65
SpringCity,Pa. K3 ....8.10
Struthers,O. Y1 .....7.65
Warren,O. C17 .....7.65
Waukegan,Ill. A7 .....7.65
Willimantic,Conn. J5 ..8.15
Youngstown F3, Y1 ....7.65

BARS, Cold-Finished Carbon (Turned and Ground)
Cumberland,Md.(5) C19.6.55

BARS, Cold-Finished Alloy
Ambridge,Pa. W18 ....9.025
BeaverFalls,Pa.M12,R2 9.025
Bethlehem,Pa. B2 .....9.025
Bridgeport,Conn. C32 ..9.175
Buffalo B5 .....9.025
Camden,N.J. P13 .....9.20
Canton,O. T7 .....9.025
Carnegie,Pa. C12 .....9.025
Chicago W18 .....9.025
Cleveland A7, C20 ....9.025
Detroit B5, P17 .....9.225
Detroit S41 .....9.025
Donora,Pa. A7 .....9.025
Elyria,O. W8 .....9.025
FranklinPark,Ill. N5 ..9.025
Gary,Ind. R2 .....9.025
GreenBay,Wis. F7 .....9.025
Hammond,Ind. J5, L2..9.025
Hartford,Conn. R2 ....9.325
Harvey,Ill. R5 .....9.025
Lackawanna,N.Y. B2..9.025
LosAngeles P2, S30 ....11.00
Mansfield,Mass. B5....9.325
Massillon,O. R2, R8 ...9.025
Midland,Pa. C18 .....9.025
Monaca,Pa. S17 .....9.025
Newark,N.J. W18 .....9.20
Plymouth,Mich. P5 ....9.225
S.Chicago,Ill. W14 ....9.025
SpringCity,Pa. K3 ....9.20
Struthers,O. Y1 .....9.025
Warren,O. C17 .....9.025
Waukegan,Ill. A7 .....9.025
Willimantic,Conn. J5 ..9.325
Worcester,Mass. A7 ..9.325
Youngstown F3, Y1 ...9.025

BARS, Reinforcing, Billet (To Fabricators)

AlabamaCity,Ala. R2 ..5.675
Atlanta A11 .....5.675
Birmingham C16 .....5.675
Buffalo R2 .....5.675
Cleveland R2 .....5.675
Ecorse,Mich. G5 .....5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala. T2 .....5.675
Fairless,Pa. U5 .....5.825
Fontana,Calif. K1 .....6.375
Ft.Worth,Tex(4)(26)T4 5.925
Gary,Ind. U5 .....5.675
Houston S5 .....5.925
Ind.Harbor,Ind. I-2,Y1 5.675
Johnstown,Pa. B2 .....5.675
Joliet,Ill. P22 .....5.675
KansasCity,Mo. S5 .....5.925
Kokomo,Ind. C16 .....5.775
Lackawanna,N.Y. B2 ..5.675
LosAngeles B3 .....6.275
Madison,Ill. L1 .....5.875
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ..6.125
Niles,Calif. P1 .....6.375
Pittsburg,Calif. C11 ..6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 .....6.425
SandSprings,Okla. S5 ..5.925
Seattle A24, B3, N14 .6.425
S.Chicago,Ill. R2, W14 .5.675
S.Duquesne,Pa. U5 .....5.675
S.SanFrancisco B3 .....6.425
SparrowsPoint,Md. B2..5.675
Sterling,Ill. (1) N15 ..5.675
Sterling,Ill. N15 .....5.775
Struthers,O. Y1 .....5.675
Tonawanda,N.Y. B12 ...6.10
Torrance,Calif. C11 ....6.375
Youngstown R2, U5 ...5.675

BARS, Reinforcing, Billet (Fabricated: To Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Houston S5 .....7.60
Johnstown,Pa. B2 .....7.33
KansasCity,Mo. S5 ....7.60
Lackawanna, N.Y. B2 ..7.35
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 .....7.35
SandSprings,Okla. S5 ...7.60
Seattle A24, B3, N14 ...7.95
SparrowsPt.,Md. B2 ...7.33
St.Paul U8 .....8.17
Williamsport,Pa. S19 ...7.25

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 14.90
Economy,Pa.(D.R.)B14 18.55
Economy(Staybolt)B14 19.00
McK Rks.(S R.) L5 ...14.50
McK.Rks.(D.R.) L5 ...19.90
McK.Rks.(Staybolt)L5. 20.95

BARS,Roll Steel

ChicagoHts.(3) C2, I-2.5.575
ChicagoHts.(4)(44) I-2 5.675
ChicagoHts. (4) C2 ....5.675
Franklin,Pa. (3) F5 ..5.575
Franklin,Pa.(4) F5 ...5.675
JerseyShore,Pa.(3) J8 ..5.55
Marion,O (3) P11 ....5.575
Tonawanda(3) B12 ....5.575
Tonawanda(4) B12 ....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ...5.10
Allenport,Pa. P7 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky.(8) A10 ...5.10
Cleveland J5, R2 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit(8) M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Fairless,Pa. U5 .....5.15
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.20
GraniteCity,Ill.(8) G4 ..5.20
Ind.Harbor,Ind. I-2, Y1.5.10
Irvin,Pa. U5 .....5.10
Lackawanna,N.Y. B2 ...5.10
Mansfield,O. E6 .....5.10
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Niles,O. M21, S3 .....5.10
Pittsburg,Calif. C11 ....5.80
Pittsburgh J5 .....5.10
Portsmouth,O. P12 .....5.10
Riverdale,Ill. A1 .....5.10
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. U5, W14 ..5.10
SparrowsPoint,Md. B2 ..5.10
Steubenville,O. W10 ....5.10
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles,O. M21, S3 .....6.275

SHEETS, H.R., Alloy

Gary,Ind. U5 .....8.40
Ind.Harbor,Ind. Y1 ....8.40
Irvin,Pa. U5 .....8.40
Munhall,Pa. U5 .....8.40
Newport,Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....7.525
Ashland,Ky. A10 .....7.525
Cleveland J5, R2 .....7.525
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.525
Fairless,Pa. U5 .....7.575
Farrell,Pa. S3 .....7.525
Fontana,Calif. K1 .....8.25
Gary,Ind. U5 .....7.525
Ind.Harbor,Ind. I-2, Y1 7.525
Irvin,Pa. U5 .....7.525
Lackawanna(35) B2 ....7.525
Munhall,Pa. U5 .....7.525
Niles,O. S3 .....7.525
Pittsburgh J5 .....7.525
S.Chicago,Ill. U5, W14.7.525
Sharon,Pa. S3 .....7.525
SparrowsPoint(36) B2..7.525
Warren,O. R2 .....7.525
Weirton,W.Va. W6 ....7.525
Youngstown U5, Y1 ...7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ....5.35
Cleveland R2 .....5.875
Warren,O. R2 .....5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....7.05
Middletown,O. A10 ....6.775
Warren,O. R2 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 ..6.275
Aliquippa,Pa. J5 .....6.275
Allenport,Pa. P7 .....6.275
Cleveland J5, R2 .....6.275
Conshohocken,Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse,Mich. G5 .....6.275
Fairfield,Ala. T2 .....6.275
Fairless,Pa. U5 .....6.325
Follansbee,W.Va. F4 ..6.275
Fontana,Calif. K1 .....7.40
Gary,Ind. U5 .....6.275
GraniteCity,Ill. G4 ....6.375
Ind.Harbor,Ind. I-2, Y1 6.275
Irvin,Pa. U5 .....6.275
Lackawanna,N.Y. B2 ..6.275
Mansfield,O. E6 .....6.275
Middletown,O A10 ....6.275
Newport,Ky. A2 .....6.275
Pittsburg,Calif. C11 ....7.225
Pittsburgh J5 .....6.275
Portsmouth,O. P12 ....6.275
SparrowsPoint,Md. B2 .6.275
Steubenville,O. W10 ...6.275
Warren,O. R2 .....6.275
Weirton,W.Va. W6 ....6.275
Yorkville,O. W10 .....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....9.275
Cleveland J5, R2 .....9.275
Ecorse,Mich. G5 .....9.275
Fairless,Pa. U5 .....9.325
Fontana,Calif. K1 .....10.40
Gary,Ind. U5 .....9.275
Ind.Harbor,Ind. I-2, Y1 9.275
Lackawanna(37) B2 ...9.275
Pittsburgh J5 .....9.275
SparrowsPoint(38) B2..9.275
Warren,O. R2 .....9.275
Weirton,W.Va. W6 ....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert

	Cu Steel	Cu Fe
Ala.City,Ala. R2	7.225	....
Ashland,Ky. A10	7.225	7.475
Canton,O. R2	7.225	7.75
Fairfield,Ala. T2	7.225	7.475
Gary,Ind. U5	7.225	7.475
GraniteCity,Ill.G4	7.325	....
Ind.Harbor I-2	7.225	7.475
Irvin,Pa. U5	7.225	7.475
Kokomo,Ind. C16	7.325	....
MartinsFry. W10	7.225	7.475
Pitts.,Calif. C11	7.975	....
Pittsburgh J5	7.225	....
SparrowsPt. B2	7.225	....

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ....7.475

SHEETS, Galvanized Steel Hot-Dipped

AlabamaCity,Ala. R2 .6.875‡
Ashland,Ky. A10 .....6.875‡
Canton,O. R2 .....6.875‡
Dover,O. E6 .....6.875†
Fairfield,Ala. T2 ....6.875†
Gary,Ind. U5 .....6.875†
GraniteCity,Ill. G4 ...6.975•
Ind.Harbor,Ind. I-2 ..6.875†
Irvin,Pa. U5 .....6.875†
Kokomo,Ind. C-16 ....6.975‡
MartinsFerry,O. W10..6.875•
Middletown,O. A10 ..6.875†
Pittsburg,Calif. C11 ..7.625•
Pittsburgh J5 .....6.875†
SparrowsPt.,Md. B2 ..6.875†
Warren,O. R2 .....6.875†
Weirton,W.Va. W6 ...6.875•

•Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

SHEETS, Well Casing

Fontana,Calif. K1 ....7.325

SHEETS, Galvanized High-Strength, Low-Alloy

Irvin,Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt.(39) B2 ..10.025

SHEETS, Galvannealed Steel

Canton,O. R2 .....7.275
Irvin,Pa. U5 .....7.275

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 .....7.125
Middletown,O. A10 ....7.125

SHEETS, Electrogalvanized

Cleveland(28) R2 .....7.65
Niles,O.(28) R2 .....7.65
Weirton,W.Va. W6 .....7.50
Youngstown J5 .....7.50

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) 9.525
Butler,Pa. A10 (type 2) 9.625

SHEETS, Enameling Iron

Ashland,Ky. A10 .....6.775
Cleveland R2 .....6.775
Fairfield,Ala. T2 .....6.775
Gary,Ind. U5 .....6.775
Ind.Harbor,Ind. I-2, Y1 6.775
Irvin,Pa. U5 .....6.775
Middletown,O. A10 ....6.775
Niles,O. M21, S3 .....6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover,O. E6 .....8.70
Follansbee,W.Va. F4 ...8.70
Ind.Harbor,Ind. I-2 ....8.70
Mansfield,O. E6 .....8.70
Warren,O. R2 .....8.70
Yorkville,O. W10 .....8.70

SHEETS, Long Terne, Steel (Commercial Quality)

BeechBottom,W.Va.W10 7.225
Gary,Ind. U5 .....7.225
Mansfield,O. E6 .....7.225
Middletown,O. A10 ....7.225
Niles,O. M21, S3 .....7.225
Warren,O. R2 .....7.225
Weirton,W.Va. W6 ....7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.625

Key To Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A24 Alaska Steel Mills Inc.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Plant, Wickwire Spencer Steel Div., Colo. Fuel & Iron
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N.Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E5 Elliott Bros. Steel Co.
E6 Empire-Reeves Steel Corp.
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div. Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.

N1 National-Standard Co.
N2 National Supply Co.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N20 Neville Ferro Alloy Co.

O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P24 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div.,EatonMfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Corp.
S40 Seneca Steel Service
S41 Stainless & Strip Div., J&L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America

T2 Tenn. Coal & Iron Div., U. S. Steel Corp.
T3 Tenn. Products & Chemical Corp.
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope Corp.
U4 Universal-Cyclops Steel
U5 United States Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide Metals Co.
U13 Union Steel Corp.

V2 Vanadium-Alloys Steel
V3 Vulcan-Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring Corp.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City, Ala. (27) R2	5.10
Allenport, Pa. P7	5.10
Alton, Ill. L1	5.30
Ashland, Ky. (8) A10	5.10
Atlanta A11	5.10
Bessemer, Ala. T2	5.10
Birmingham C15	5.10
Buffalo (27) R2	5.10
Conshohocken, Pa. A3	5.15
Detroit M1	5.10
Ecorse, Mich. G5	5.10
Fairfield, Ala. T2	5.10
Farrell, Pa. S3	5.10
Fontana, Calif. K1	5.825
Gary, Ind. U5	5.10
Ind. Harbor, Ind. I-2, Y1	5.10
Johnstown, Pa. (25) B2	5.10
Lackaw'na, N.Y. (25) B2	5.10
LosAngeles (25) B3	5.85
LosAngeles C1	8.60
Minnequa, Colo. C10	6.20
Riverdale, Ill. A1	5.10
SanFrancisco S7	6 60
Seattle (25) B3	6.10
Seattle N14	6.60
Sharon, Pa. S3	5.10
S. Chicago, Ill. W14	5.10
S. SanFrancisco (25) B3	5.85
SparrowsPoint, Md. B2	5.10
Torrance, Calif. C11	5.85
Warren, O. R2	5.10
Weirton, W. Va. W6	5.10
Youngstown U5	5.10

STRIP, Hot-Rolled Alloy

Carnegie, Pa. S18	8.40
Farrell, Pa. S3	8.40
Gary, Ind. U5	8.40
Houston S5	8.65
Ind. Harbor, Ind. Y1	8.40
KansasCity, Mo. S5	8.65
LosAngeles B3	9.60
Lowellville, O. S3	8.40
Newport, Ky. A2	8.40
Sharon, Pa. A2, S3	8.40
S. Chicago, Ill. W14	8.40
Youngstown U5, Y1	8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland, Ky. A10	7.575
Bessemer, Ala. T2	7.575
Conshohocken, Pa. A3	7.575
Ecorse, Mich. G5	7.575
Fairfield, Ala. T2	7.575
Farrell, Pa. S3	7.575
Gary, Ind. U5	7.575
Ind. Harbor, Ind. I-2, Y1	7.575
Lackawanna, N.Y. B2	7.575
LosAngeles (25) B3	8.325
Seattle (25) B3	8.575
Sharon, Pa. S3	7.575
S. Chicago, Ill. W14	7.575
S. SanFrancisco (25) B3	8.325
SparrowsPoint, Md. B2	7.575
Warren, O. R2	7.575
Weirton, W. Va. W6	7.575
Youngstown U5, Y1	7.575

STRIP, Hot-Rolled Ingot Iron

Ashland, Ky. (8) A10	5.35
Warren, O. R2	5.875

STRIP, Cold-Rolled Carbon

Anderson, Ind. G6	7.425
Baltimore T6	7.425
Boston T6	7.975
Buffalo S40	7.425
Cleveland A7, J5	7.425
Dearborn, Mich. S3	7.425
Detroit D2, M1, P20	7.425
Dover, O. G6	7.425
Evanston, Ill. M22	7.525
Farrell, Pa. S3	7.425
Follansbee, W. Va. W10	7.425
Fontana, Calif. K1	9.20
FranklinPark, Ill. T6	7.525
Ind. Harbor, Ind. Y1	7.425
Indianapolis S41	7.575
LosAngeles C1, S41	9.30
McKeesport, Pa. E10	7.525
NewBedford, Mass. R10	7.875
NewBritain, Conn. S15	7.875
NewCastle, Pa. B4, E5	7.425
NewHaven, Conn. D2	7.875
NewKensington, Pa. A6	7.425
Pawtucket, R.I. R3	7.975
Pawtucket, R.I. N8	7.975
Philadelphia P24	7.875
Pittsburgh J5	7.425
Riverdale, Ill. A1	7.525
Rome, N.Y. (32) R6	7.425
Sharon, Pa. S3	7.425
Trenton, N.J. (31) R5	8.875
Wallingford, Conn. W2	7.875
Warren, O. R2, T5	7.425
Worcester, Mass. A7	7.975

STRIP, Cold-Rolled Alloy

Boston T6	15.90
Carnegie, Pa. S18	15.55
Cleveland A7	15.55
Dover, O. G6	15.55
Farrell, Pa. S3	15.55
FranklinPark, Ill. T6	15.55
Harrison, N.J. S18	15.55
Indianapolis S41	15.70
LosAngeles S41	17.75
Lowellville, O. S3	15.55
Pawtucket, R.I. N8	15.90
Riverdale, Ill. A1	15.55
Sharon, Pa. S3	15.55
Worcester, Mass. A7	15.85
Youngstown S41	15.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7	10.80
Dearborn, Mich. S3	10.80
Dover, O. G6	10.80
Farrell, Pa. S3	10.80
Ind. Harbor, Ind. Y1	10.80
Sharon, Pa. S3	10.80
Warren, O. R2	10.80

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol, Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie, Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn, Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover, O. G6	8.95	10.40	12.60	15.60	18.55
Evanston, Ill. M22	8.95	10.40	12.60	15.60	....
Farrell, Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria, O. S1	10.05	10.40	12.60	15.60	....
FranklinPark, Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison, N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain, Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle, Pa. B4, E5	8.95	10.40	12.60	15.60	....
NewHaven, Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington, Pa. A6	9.85	10.40	12.60	15.60	....
NewYork W3	....	10.70	12.90	16.10	19.30
Pawtucket, R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale, Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome, N.Y. (32) R6	8.95	10.40	12.60	15.60	18.55
Sharon, Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton, N.J. R5	....	10.70	12.90	15.90	18.85
Wallingford, Conn. W2	9.40	10.70	12.90	15.90	18.75
Warren, O. T5	8.95	10.40	12.60	15.60	18.55
Worcester, Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)	0.80C	1.05C	1.35C
Bristol, Conn. W1	18.85	22.95	27.80
Buffalo W12	18.85	....	....
Fostoria, O. S1	19.05	22.15	....
FranklinPark, Ill. T6	19.20	23.30	28.15
Harrison, N.J. C18	18.85	22.95	27.80
New York W3	18.85	22.95	27.80
Palmer, Mass. W12	18.85	....	....
Trenton, N.J. R5	18.85	22.95	27.80
Worcester, Mass. A7, T6	18.85	22.95	27.80
Youngstown S41	19.20	23.30	28.15

Weirton, W. Va. W6 ....10.80
Youngstown Y1 .....10.80

STRIP, Cold-Rolled Ingot Iron

Warren, O. R2 .....8.175

STRIP, C.R. Electrogalvanized

Cleveland A7	7.425*
Dover, O. G6	7.425*
Evanston, Ill. M22	7.525*
McKeesport, Pa. E10	7.50*
Riverdale, Ill. A1	7.525*
Warren, O. B9, 83, T5	7.425*
Worcester, Mass. A7	7.975
Youngstown S41, Y1	7.425*

*Plus galvanizing extras.

STRIP, Galvanized (Continuous)

Farrell, Pa. S3	7.50
Sharon, Pa. S3	7.50

TIGHT COOPERAGE HOOP

Atlanta A11	5.65
Farrell, Pa. S3	5.525
Riverdale, Ill. A1	5.675
Sharon, Pa. S3	5.525
Youngstown U5	5.525

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa, Pa. J5	$9.10	$9.35	$9.75
Fairfield, Ala. T2	9.20	9.45	9.85
Fairless, Pa. U5	9.20	9.45	9.85
Fontana, Calif. K1	9.75	10.00	10.40
Gary, Ind. U5	9.10	9.35	9.75
GraniteCity, Ill. G4	9.20	9.45	9.60
IndianaHarbor, Ind. I-2, Y1	9.10	9.35	9.75
Irvin, Pa. U5	9.10	9.35	9.75
Niles, O. R2	9.10	9.35	9.75
Pittsburg, Calif. C11	9.75	10.00	10.40
SparrowsPoint, Md. B2	9.10	9.35	9.75
Weirton, W. Va. W6	9.10	9.35	9.75
Yorkville, O. W10	9.10	9.35	9.75

ELECTROLYTIC TIN-COATED SHEET (Dollars per 100 lb)

Aliquippa, Pa. J5 (21-27 Ga.)	....	7.90	8.10	....
IndianaHarbor, Ind. Y1 (20-27 Ga.)	....	7.90	....	....
Niles, O. R2 (20-27 Ga.)	....	7.90	8.10	8.30

TIN PLATE, Hot Dipped Common Coke	1.25 lb	1.50 lb
Aliquippa, Pa. J5	$10.40	$10.65
Fairfield, Ala. T2	10.50	10.75
Fontana, Calif. K1	11.05	11.30
Gary, Ind. U5	10.40	10.65
Ind. Harb. Y1	10.40	10.65
Irvin, Pa. U5	10.40	10.65
Pitts., Calif. C11	11.05	11.30
Sp. Pt., Md. B2	10.40	10.65
Weirton, W. Va. W6	10.40	10.65
Yorkville, O. W10	10.40	10.65

BLACK PLATE (Base Box)

Aliquippa, Pa. J5	$8.20
Fairfield, Ala. T2	8.30
Fairless, Pa. U5	8.30
Fontana, Calif. K1	8.85
Gary, Ind. U5	8.20
GraniteCity, Ill. G4	8.30
Ind. Harbor, Ind. I-2, Y1	8.20
Irvin, Pa. U5	8.20
Niles, O. R2	8.20
Pittsburg, Calif. C11	8.85
SparrowsPoint, Md. B2	8.20
Weirton, W. Va. W6	8.20
Yorkville, O. W10	8.20

HOLLOWARE ENAMELING Black Plate (29 Gage)

Aliquippa, Pa. J5	7.85
Gary, Ind. U5	7.85
GraniteCity, Ill. G4	7.95
Ind. Harbor, Ind. Y1	7.85
Irvin, Pa. U5	7.85
Yorkville, O. W10	7.85

MANUFACTURING TERNES (Special Coated, Base Box)

Gary, Ind. U5	$10.05
Irvin, Pa. U5	10.05

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom, W. Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge, Pa. A4	....	....	12.40	13.55	14.65
GraniteCity, Ill. G4	9.975*	11.30*	12.00*	13 15*	....
IndianaHarbor, Ind. I-2	9.875*	11.20*	11.90*	13.05*	....
Mansfield, O. E6	9.875*	11.70	12.40	13 55	14.65
Newport, Ky. A2	9.875	11.70*	12.40*	13.55*	14.65*
Niles, O. M21	9.875*	11.70	12.40	13.55	....
Vandergrift, Pa. U5	9.875*	11.70	12.40	13 55	14.65
Warren, O. R2	9.875*	11.70	12.40	13.55	14.65
Zanesville, O. A10	....	11.70†	12.40	13.55	14.65

	Stator
Vandergrift, Pa. U5	8.10
Mansfield, O. E6	8.10
Warren, O. R2 (Silicon Lowcore)	8.10

SHEETS (22 Ga., coils & cut lengths)

Fully Processed (Semiprocessed ½c lower)	T-72	T-65	T-58	T-52
BeechBottom, W. Va. W10	15.70	16.30	16.80	17.85
Vandergrift, Pa. U5	15.70	16.30	16.80	17.85
Zanesville, O. A10	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge, Pa. A4	....	18.10	19 70	20.20	20 70	15.70††
Butler, Pa. A10	....	....	19.70	20.20	20.70	....
Vandergrift, Pa. U5	17.10	18.10	19.70	20.20	20.70	15.70
Warren, O. R2	....	....	....	....	....	15.70‡

*Semiprocessed. †Fully processed only. ‡Coils, annealed; semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity, Ala. R2	8.00
Aliquippa, Pa. J5	8.00
Alton, Ill. L1	8.20
Atlanta A1	8.00
Bartonville, Ill. K4	8.10
Buffalo W12	8.00
Chicago W13	8.00
Cleveland A7, C20	8.00
Crawfordsville, Ind. M8	8.10
Donora, Pa. A7	8.00
Duluth A7	8.00
Fairfield, Ala. T2	8.00
Fostoria, O. (24) S1	8.10
Houston S5	8.25
Jacksonville, Fla. M8	8.35
Johnstown, Pa. B2	8.00
Joliet, Ill. A7	8.00
KansasCity, Mo. S5	8.25
Kokomo, Ind. C16	8.10
LosAngeles B3	8.95
Minnequa, Colo. C10	8.25
Monessen, Pa. P7, P16	8.00
Muncie, Ind. I-7	8.30
Palmer, Mass. W12	8.30
Pittsburg, Calif. C11	8.95
Portsmouth, O. P12	8.00
Rankin, Pa. A7	8.00
S. Chicago, Ill. R2	8.00
S. SanFrancisco C10	8.95
SparrowsPoint, Md. B2	8.10
Sterling, Ill. (1) N15	8.00
Sterling, Ill. N15	8.10
Struthers, O. Y1	8.00
Waukegan, Ill. A7	8.00
Worcester, Mass. A7	8.50

WIRE, Cold Heading Carbon

Elyria, O. W8	8.00

Wire, Gal'd., for ACSR

Bartonville, Ill. K4	12.65
Buffalo W12	13 40
Cleveland A7	12.65
Donora, Pa. A7	12.65
Duluth A7	12.65
Johnstown, Pa. B2	13.40
KansasCity, Mo. U3	12.90
Minnequa, Colo. C10	12.775
Monessen, Pa. P7, P16	12.65
Muncie, Ind. I-7	13.60
NewHaven, Conn. A7	12.95
Palmer, Mass. W12	13.70
Pittsburg, Calif. C11	13.45
Portsmouth, O. P12	12.65
Roebling, N.J. R5	12.95
SparrowsPt., Md. B2	13.50
Struthers, O. Y1	13.40
Trenton, N.J. A7	12.95
Waukegan, Ill. A7	12.65
Worcester, Mass. A7	12.95

WIRE, Upholstery Spring

Aliquippa, Pa. J5	9.75
Alton, Ill. L1	9.95
Buffalo W12	9.75
Cleveland A7	9.75
Donora, Pa. A7	9.75
Duluth A7	9.75
Johnstown, Pa. B2	9.75
KansasCity, Mo. S5, U3	10.00
LosAngeles B3	10.70
Minnequa, Colo. C10	9.95
Monessen, Pa. P7, P16	9.75
NewHaven, Conn. A7	10.05
Palmer, Mass. W12	10.05
Pittsburg, Calif. C11	10.70
Portsmouth, O. P12	9.75
Roebling, N.J. R5	10.05
S. Chicago, Ill. R2	9.75
S. SanFrancisco C10	10.70
Sparrows Pt., Md. B2	9.85
Struthers, O. Y1	9.75
Trenton, N.J. A7	10.05
Waukegan, Ill. A7	9.75
Worcester, Mass. A7, J4, T6	10.05

WIRE, MB Spring, High-Carbon

Aliquippa, Pa. J5	9.75
Alton, Ill. L1	9.95
Bartonville, Ill. K4	9.85
Buffalo W12	9.75
Cleveland A7	9.75
Donora, Pa. A7	9 75
Duluth A7	9.75
Fostoria, O. S1	9.80
Johnstown, Pa. B2	9 75
KansasCity, Mo. S5, U3	10.00
LosAngeles B3	10.70
Milbury, Mass. (12) N6	10.05
Minnequa, Colo. C10	9.95
Monessen, Pa. P7, P16	9.75
Muncie, Ind. I-7	9.95
Palmer, Mass. W12	10.05
Pittsburg, Calif. C11	10.70
Portsmouth, O. P12	9.75
Roebling, N.J. R5	10.05
S. Chicago, Ill. R2	9.75
S. SanFrancisco C10	10.70
SparrowsPt., Md. B2	9.85
Struthers, O. Y1	9.75
Trenton, N.J. A7	10.05
Waukegan, Ill. A7	9.75
Worcester, Mass. A7, J4, T6	10.05

WIRE, Fine & Weaving (8" Coils)

Alton, Ill. L1	16.50
Bartonville, Ill. K4	16.40
Chicago W13	16.30
Cleveland A7	16.30
Crawfordsville, Ind. M8	16.40
Fostoria, O. S1	16.30
Houston S5	16.55
Jacksonville, Fla. M8	16.65
Johnstown, Pa. B2	16.30
KansasCity, Mo. S5	16.55
Kokomo, Ind. C16	16.30
Minnequa, Colo. C16	16.55
Monessen, Pa. P16	16.30
Muncie, Ind. I-7	16.50
Palmer, Mass. W12	16.60
S. SanFrancisco C10	17.15
Waukegan, Ill. A7	16.30
Worcester, Mass. A7, J6	16.60

WIRE, Tire Bead

Bartonville, Ill. K4	17.15
Monessen, Pa. P16	17.15
Roebling, N.J. R5	17.65

ROPE WIRE (A)

Bartonville, Ill. K4	13.45
Buffalo W12	13.45
Fostoria, O. S1	13.45
KansasCity, Mo. U3	13.70
Johnstown, Pa. B2	13.45
Monessen, Pa. P7	13.45
Muncie, Ind. I-7	13.65
Palmer, Mass. W12	13.75
Portsmouth, O. P12	13.45
Roebling, N.J. R5	13.75
St. Louis L8	13.45
SparrowsPt., Md. B2	13.55
Struthers, O. Y1	13.45
Worcester, Mass. J4	13.75

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

Wire, Cold-Rolled Flat

Anderson,Ind. G6	12.35
Baltimore T6	12.65
Boston T6	12.65
Buffalo W12	12.35
Chicago W13	12.45
Cleveland A7	12.35
Crawfordsville,Ind. M8	12.35
Dover,O. G6	12.35
Farrell,Pa. S3	12.35
Fostoria,O. S1	12.35
FranklinPark,Ill. T6	12.45
Kokomo,Ind. C16	12.35
Massillon,O. R8	12.35
Milwaukee C23	12.55
Monessen,Pa. P7, P16	12.35
Palmer,Mass. W12	12.65
Pawtucket,R.I. N8	12.65
Philadelphia P24	12.65
Riverdale,Ill. A1	12.45
Rome,N.Y. R6	12.35
Sharon,Pa. S3	12.35
Trenton,N.J. R5	12.65
Warren,O. B9	12.35
Worcester,Mass. A7,T6	12.65

NAILS, Stock

	Col.
AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	175
Bartonville,Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla. M8	175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
Rankin,Pa. A7	173
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

(To Wholesalers: per cwt)

Galveston,Tex. D7 ...$10.30

NAILS, Cut (100 lb kegs)

Wheeling,W.Va. W10 ..$10.10

POLISHED STAPLES

	Col.
AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	173
Atlanta A11	177
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. M8	177
Johnstown,Pa. B2	175
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	180
Pittsburg,Calif. C11	194
Rankin,Pa. A7	173
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	177
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	181

TIE WIRE, Automatic Baler (14½ Ga.Hper 97 lb Net Box)

Coil No. 3150

AlabamaCity,Ala. R2	9.24
Atlanta A11	10.36
Bartonville,Ill. K4	9.34
Buffalo W12	10.26
Chicago W13	9.24
Crawfordsville,Ind. M8	9.34
Donora,Pa. A7	9.24
Duluth A7	9.24
Fairfield,Ala. T2	9.24
Houston S5	10.51
Jacksonville,Fla. M8	9.34
Johnstown,Pa. B2	10.26
Joliet,Ill. A7	9.24
KansasCity,Mo. S5	10.51
Kokomo,Ind. C16	9.34
LosAngeles B3	11.05
Minnequa,Colo. C10	10.51
Pittsburg,Calif. C11	9.94
S.Chicago,Ill. R2	9.24
S.SanFrancisco C10	11.04
SparrowsPt.,Md. B2	10.36
Sterling,Ill.(37) N15	9.34

Coil No. 6500 Stand.

AlabamaCity,Ala. R2	9.54
Atlanta A11	10.70
Bartonville,Ill. K4	9.64
Buffalo W12	10.60
Chicago W13	9.54
Crawfordsville,Ind. M8	9.64
Donora,Pa. A7	9.54
Duluth A7	9.54
Fairfield,Ala. T2	9.54
Houston S5	10.85
Jacksonville,Fla. M8	9.64
Johnstown,Pa. B2	10.60
Joliet,Ill. A7	9.54
KansasCity,Mo. S5	10.85
Kokomo,Ind. C16	9.54
LosAngeles B3	11.40
Minnequa,Colo. C10	10.85
Pittsburg,Calif. C11	10.28
S.Chicago,Ill. R2	9.54
S.SanFrancisco C10	11.40
SparrowsPt.,Md. B2	10.70
Sterling,Ill.(37) N15	9.64

Coil No. 6500 Interim

AlabamaCity,Ala. R2	$9.59
Atlanta A11	10.75
Bartonville,Ill. K4	9.69
Buffalo W12	10.65
Chicago W13	9.59
Crawfordsville,Ind	M8..9.69
Donora,Pa. A7	9.59
Duluth A7	9.59
Fairfield,Ala. T2	9.59
Houston S5	10.90
Jacksonville,Fla. M8	9.69
Johnstown,Pa. B2	10.65
Joliet,Ill. A7	9.59
KansasCity,Mo. S5	10.90
Kokomo,Ind. C16	9.69
LosAngeles B3	11.45
Minnequa,Colo. C10	10.90
Pittsburg,Calif. C11	10.31
S.Chicago,Ill. R2	9.59
S.SanFrancisco C10	11.45
SparrowsPt.,Md. B2	10.75
Sterling,Ill.(37) N15	9.69

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	212
Atlanta A11	214
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
Pittsburg,Calif. C11	236
S.SanFrancisco C10	236
SparrowsPt.,Md. B2	214
Sterling,Ill.(7) N15	214

FENCE POSTS

	Col.
Birmingham C15	177
ChicagoHts.,Ill. C2, I-2	177
Duluth A7	177
Franklin,Pa. F5	177
Johnstown,Pa. B2	177
Marion,O. P11	177
Minnequa,Colo. C10	182
Tonawanda,N.Y. B12	177

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	193**
Aliquippa,Pa. J5	190§
Atlanta A11	198§
Bartonville,Ill. K4	198
Crawfordsville,Ind. M8	198
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield,Ala. T2	193†
Houston S5	198**
Jacksonville,Fla. M8	198
Johnstown,Pa. B2	196§
Joliet,Ill. A7	193†
KansasCity,Mo. S5	198**
Kokomo,Ind. C16	195†
Minnequa,Colo. C10	198**
Monessen,Pa. P7	196§
Pittsburg,Calif. C11	213†
Rankin,Pa. A7	193†
S.Chicago,Ill. R2	193**
S.SanFrancisco C10	213*
SparrowsPoint,Md. B2	198§
Sterling,Ill.(7) N15	198

WOVEN FENCE, 9-15 Ga.

	Col.
Ala.City,Ala. R2	187**
Aliq'ppa,Pa.9-11½ga.J5	190§
Atlanta A11	192§
Bartonville,Ill K4	192
Crawfordsville,Ind. M8	192
Donora,Pa. A7	187†
Duluth A7	187†
Fairfield,Ala. T2	187†
Houston S5	192**
Jacksonville,Fla. M8	192
Johnstown,Pa.(43) B2	190§
Joliet,Ill. A7	187†
KansasCity,Mo. S5	192**
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192**
Pittsburg,Calif. C11	210†
Rankin,Pa. A7	187†
S.Chicago,Ill. R2	187**
Sterling,Ill.(7) N15	192

WIRE (16 gage)

	An'ld Galv.	Stone
Ala.City,Ala.R2	17.85	19.40**
Aliq'ppa,Pa. J5	17.85	19.65
Bartonville K4	17.95	19.80
Cleveland A7	17.85	....
Craw'dville B8	17.95	19.80‡‡
Fostoria,O. S1	18.35	19.90†
Houston S5	18.10	19.65**
Jacksonville M8	18.95	19.80‡‡
Johnstown B2	17.85	19.65§
Kan.City,Mo. S5	18.10	....
Kokomo C16	17.25	18.80†
Minnequa C10	18.10	19.65**
P'lm'r,Mass.W12	18.15	19.70†
Pitts.Calif. C11	18.20	19.75†
S.SanFran. C10	18.20	19.75**
St'ling(37) N15	17.95	19.80
SparrowsPt. B2	17.95	19.75§
Waukegan A7	17.85	19.40†
Worcester A7	18.15	....

WIRE, Merchant Quality (6 to 8 gage)

	An'd Galv.
Ala.City,Ala. R2	9.00 9.55**
Aliquippa J5	8.65 9.325§
Atlanta(48)A11	9.10 9.775§
Bartonville(48) K4	9.10 9.80
Buffalo W12	9.00 9.55†
Cleveland A7	9.00 ....
Crawfordsville M8	9.10 9.80††
Donora,Pa. A7	9.00 9.55†
Duluth A7	9.00 9.55†
Fairfield T2	9.00 9.55†
Houston(48) S5	9.25 9.80**
Jack'ville,Fla. M8	9.10 9.80‡‡
Johnstown(48) B2	9.00 9.675§
Joliet,Ill. A7	9.00 9.55†
KansCity(48) S5	9.25 9.80**
Kokomo(48) S16	9.10 9.65†
LosAngeles B3	9.95 10.625§
Monessen(48) P7	8.65 9.35§
Palmer,Mass. W12	9.30 9.85†
Pitts.,Calif. C11	9.95 10.50†
Rankin,Pa. A7	9.00 9.55†
S.Chicago R2	9.00 9.55**
S.SanFran. C10	9.95 10.50**
Spar'wsPt.(48)B2	9.10 9.775§
St'ling(37)(48) N15	9.10 9.80
Struthers,O. Y1	9.00 9.65‡
Worcester,Mass.A7	9.30 9.85†

Based on zinc price of: *13.50. †5c. §10c. ‡Less than 10c. ††10.50c. ‡‡11.00c. **Subject to zinc equalization extras.

FASTENERS

(Base discounts, shipments of one to four containers, per cent off list, f.o.b.mill)

BOLTS

Machine Bolts
Full Size Body (cut thread)
½ in. and smaller:

3 in. and shorter	55.0
3¼ in. thru 6 in.	50.0
Longer than 6 in.	37.0
⅝ in., 3 in. & shorter	47.0
3¼ in. thru 6 in.	40.0
Longer than 6 in.	31.0
¾ in. thru 1 in.:	
6 in. and shorter	37.0
Longer than 6 in.	31.0
1⅛ in. and larger:	
All lengths	31.0

Undersize Body (rolled thread)
½ in. and smaller:

3 in. and shorter	55.0
3¼ in. thru 6 in.	50.0

Carriage Bolts
Full Size Body (cutthread) & Undersize Body (rolled thread)
½ in. and smaller:

6 in. and shorter	48.0
Larger diameters and longer lengths	35.00

Lag, Plow, Tap, Blank, Step, Elevator, Tire, and Fitting Up Bolts
½ in. and smaller:

6 in. and shorter	48.0
Larger diameters and longer lengths	35.0

High Tensile Structural Bolts
(Reg. semifinished hex head bolts, heavy semifinished hex nuts. Bolts — High-carbon steel, heat treated. Spec. (ASTM A-325, in bulk. Full keg quantity)

⅝ in. diam	50.0
¾ in. diam	47.0
⅞ and 1 in. diam	43.0
1⅛ and 1¼ in. diam	34.0

NUTS

(Keg or case quantity and over)

Square Nuts, Reg. & Heavy:
(Full container)

All sizes	56.0

Hex Nuts, Reg. & Heavy
Hot Pressed & Cold Punched:

¾ in. and smaller	62.0
⅞ in. to 1½ in., incl.	56.0
1⅝ in. and larger	51.5

Hex Nuts, Semifinished, Heavy (Incl. Slotted):

¾ in. and smaller	62.0
⅞ in. to 1½ in. incl.	56.0
1⅝ in. and larger	51.5

Hex Nuts, Finished (Incl. Slotted and Castellated):

⅞ in. and smaller	65.0
1 in. to 1½ in., incl.	57.0
1⅝ in. and larger	51.5

Semifinished Hex Nuts, Reg. (Incl. Slotted):

½ in. and smaller	62.0
⅝ in. to ⅞ in., incl.	65.0
1 in. to 1½ in., incl.	57.0
1⅝ in. and larger	51.5

CAP AND SETSCREWS
(Base discounts, packages, per cent off list, f.o.b. mill)
Hex Head Cap Screws, Coarse or Fine Thread, Bright:
6 in. and shorter:

½ in. and smaller	35.0
⅝, ¾, and 1 in.	16.0
Longer than 6 in.:	
½ in and smaller	3.0
⅝, ¾, and 1 in.	+11.0

High Carbon, Heat Treated:
6 in. and shorter:

½ in. and smaller	20.0
⅝, ¾, and 1 in.	+ 5.0

Longer than 6 in.:

½ in. and smaller	+19.0
⅝, ¾, and 1 in.	+39.0

Flat Head Cap Screws:
¾ in. and smaller, 6 in. and shorter +85.0
Setscrews, Square Head, Cup Point, Coarse Thread:
Through 1 in. diam:
6 in. and shorter + 5.0
Longer than 6 in. +29.0

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.
Structural ½ in., larger 12.85
7/16 in. and smaller by 6 in. and shorter: 15% off list.

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over)

	Standard Diameter, Inches				
	1/4	5/16	3/8	7/16	1/2
Alton,Ill. L1	$28.95	$43.40	$55.40	$73.00	$95.10
Buffalo W12	28.95	43.40	55.40	73.00	95.10
Cleveland A7	28.95	43.40	55.40	73.00	....
KansasCity,Mo. U3	29.85	43.00	55.40	73.00	95.10
Monessen,Pa. P16	32.15	48.20	61.55	81.10	105.65
NewHaven,Conn. A7	28.95	43.40	55.40	73.00	95.10
Pittsburg,Calif. C11	28.95	43.40	55.40	73.00	95.10
Pueblo,Colo. C10	28.95	43.40	55.40	73.00	95.10
Roebling,N.J. R5	28.95	43.40	55.40	73.00	95.10
SparrowsPoint,Md. B2	28.95	43.40	55.40	73.00	95.10
St.Louis L8	28.95	43.40	55.40	73.00	95.10
Waukegan,Ill. A7	28.95	43.40	55.40	73.00	95.10

RAILWAY MATERIALS

	Standard No. 1	Standard No. 2	Standard All No. 2	Tee Rails 60 lb Under
Rails				
Bessemer,Pa. U5	5.75	5.60	....	6.725
Ensley,Ala. T2	....	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....	(16)6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.225
Steelton,Pa. B2	5.75	5.65	....	....
Williamsport,Pa. S19	....	....	....	6.725

TIE PLATES

Fairfield,Ala. T2	6.875
Gary,Ind. U5	6.875
Lackawanna,N.Y. B2	6.875
Minnequa,Colo. C10	6.875
Seattle B3	7.025
Steelton,Pa. B2	6.875
Torrance,Calif. C11	6.875

JOINT BARS

Bessemer,Pa. U5	7.25
Fairfield,Ala. T2	7.25
Joliet,Ill. U5	7.25
Lackawanna,N.Y. B2	7.25
Minnequa,Colo. C10	7.25
Steelton,Pa. B2	7.25

AXLES

Ind.Harbor,Ind. S13	9.125
Johnstown,Pa. B2	9.125

TRACK BOLTS, Untreated

Cleveland R2	15.35
KansasCity,Mo. S5	15.35
Lebanon,Pa. B2	15.35
Minnequa,Colo C10	15.35
Pittsburgh S44	15.35
Seattle B3	15.85

SCREW SPIKES

Lebanon,Pa. B2	15.10

STANDARD TRACK SPIKES

Fairfield,Ala. T2	10.10
Ind.Harbor,Ind. I-2,Y1	10.10
KansasCity,Mo. S5	10.10
Lebanon,Pa. B2	10.10
Minnequa,Colo. C10	10.10
Pittsburgh J5	10.10
Seattle B3	10.60
S.Chicago,Ill. R2	10.10
Struthers,O. Y1	10.10
Youngstown R2	10.10

Footnotes

(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant.
(4) Reinforcing.
(5) 1⅛ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in., 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(6) Chicago or Birm. base.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality
(10) Pittsburgh base.
(11) Cleveland & Pitts. base.
(12) Worcester, Mass., base.
(13) Add 0.25c for 17 Ga. & heavier.
(14) Gage 0.143 to 0.249 in.; for gage 0.142 and lighter, 5.80c.
(15) ⅝" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(18) To dealers.
(19) Chicago & Pitts. base.
(21) New Haven, Conn., base.
(22) Deld. San Francisco Bay area.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(26) Deld. in mill zone, 6.295c.
(27) Bar mill sizes.
(28) Bonderized.
(29) Youngstown base.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(34) 9.60c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter; 60" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.035"; 0.035" and heavier, 0.25c higher.
(41) 9.10c for cut lengths.
(42) Mill lengths, f.o.b. mill; deld. in mill zone or within switching limits, 5.635c.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds; 9.65c, over 3½ in. and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....								
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	1.5	+27	+10.5	+36	+21	+45.5	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+3.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+7.75
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.72		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+6.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+9.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on price of zinc at 12.50c, East St.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	Rerolling Ingot	Rerolling Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	....	43.50	39.25	48.50	45.00
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	49.25
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	47.50
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	52.00
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	31.25	42.00	43.75	47.00	49.50	45.75	55.00	55.00
304L	....	....	49.75	51.50	54.75	57.25	53.50	62.75	62.75
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.25	75.75	71.75	80.75	80.75
316L	....	....	72.25	76.25	79.50	83.50	79.50	88.50	88.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.00	65.50
330	....	....	123.25	....	113.00	143.75	135.00	149.25	149.25
18-8 CbTa	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	79.25
403	....	....	29.25	....	33.25	35.00	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	29.25	31.00	33.25	35.00	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	40.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	51.75
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steel Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Steel Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates 5%	Plates Carbon Base 10%	Plates Carbon Base 15%	Plates Carbon Base 20%	Sheets Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	26.05	23.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	48.90	59.55	70.15	80.55	....
Nickel	41.65	51.95	63.30	72.70	....
Nickel, Low Carbon	41.95	52.60	63.30	74.15	....
Monel	43.35	53.55	63.80	74.05	....

	Strip, Carbon Base —Cold Rolled— 10%	Strip, Carbon Base —Cold Rolled— Both Sides
Copper*	$36.80	$44.20

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. L7, New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	V-Cr Hot Work (H-13)	0.550
Spec. Carbon (W-1)	0.385	W-Cr Hot Work (H-12)	0.530
Oil Hardening (O-1)	0.505	W Hot Wk. (H-21)	1.425-1.44
V-Cr Hot Work (H-11)	0.505	Hi-Carbon-Cr (D-11)	0.955

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	....	T-1	1.840
18	4	2	....	....	T-2	2.005
13.5	4	3	....	....	T-3	2.105
18.25	4.25	1	4.75	....	T-4	2.545
18	4	2	9	....	T-5	2.915
20.25	4.25	1.6	12.95	....	T-6	4.330
13.75	3.75	2	5	....	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C12, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

F.o.b. furnace prices in dollars per gross ton, as reported to STEEL. Minimum delivered prices are approximate.

	Basic	No. 2 Foundry	Malle-able	Besse-mer
Birmingham District				
Birmingham R2	62.00	62.50**	....	....
Birmingham U6	....	62.50**	66.50	....
Woodward,Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N.Tonawanda,N.Y. T9	....	66.50	67.00	67.50
Tonawanda,N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester,N.Y., deld.	69.02	69.52	70.02	....
Syracuse,N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S.Chicago,Ill. R2	66.00	66.50	66.50	67.00
S.Chicago,Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	69.02	69.52	69.52	70.02
Muskegon,Mich., deld.	....	74.52	74.52	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron,Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro,Pa. B10	68.00	68.50	69.00	69.50
Chester,Pa. P4	68.00	68.50	69.00	....
Swedeland,Pa. A3	68.00	68.50	69.00	69.50
NewYork, deld.	....	75.50	76.00	....
Newark,N.J., deld.	72.69	73.19	73.69	74.19
Philadelphia, deld.	70.41	70.91	71.41	71.99
Troy,N.Y. R2	68.00	68.50	69.00	69.50
Pittsburgh District				
Neville Island,Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), Aliquippa, deld.	....	67.95	67.95	68.48
McKeesRocks,Pa., deld.	....	67.60	67.60	68.13
Lawrenceville,Homestead, Wilmerding,Monaca,Pa., deld.	....	68.26	68.26	69.79
Verona,Trafford,Pa., deld.	68.29	68.82	68.82	69.35
Brackenridge,Pa., deld.	65.60	69.10	69.10	69.63
Midland,Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard,Ohio Y1	....	....	66.50	....
Sharpsville,Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....
Mansfield,Ohio, deld.	71.30	....	71.80	72.30
Duluth I-3	66.00	66.50	66.50	67.00
Erie,Pa. I-3	66.00	66.50	66.50	67.00
Everett,Mass. E1	67.50	65.00	65.50	....
Fontana,Calif. K1	75.00	75.50	....	....
Geneva,Utah C11	66.00	66.50	....	....
GraniteCity,Ill. G4	67.90	68.40	68.90	....
Ironton,Utah C11	66.00	66.50	....	....
Minnequa,Colo. C10	68.00	66.50	69.00	....
Rockwood,Tenn. T3	....	62.50‡	66.50	....
Toledo,Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....

*Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 11.50%; starting with silicon over 11.50% add $1.50 per ton for each 0.50% silicon or portion thereof up to 14%; add $1 for each 0.50% Mn over 1%)

Jackson,Ohio I-3, J1	$78.00
Buffalo H1	79.25

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

CalvertCity,Ky. P15	$99.00
NiagaraFalls,N.Y. P15	99.00
Keokuk,Iowa Open-hearth & Fdry, K2	89.00
Keokuk,Iowa O.H. & Fdry, 12½ lb piglets, 16% Si, K2	92.00

LOW PHOSPHORUS PIG IRON, Gross Ton

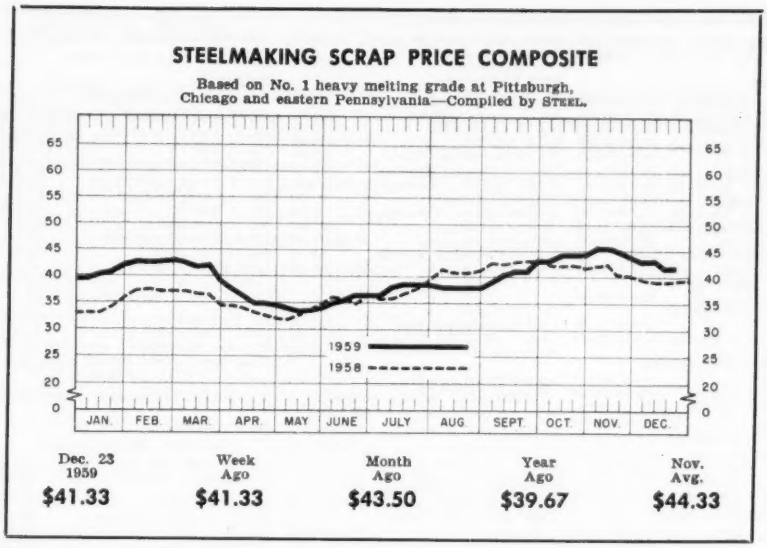
Lyles,Tenn. T3 (Phos. 0.035% max)	$73.00
Rockwood,Tenn. T3 (Phos. 0.035% max)	73.00
Troy,N.Y. R2 (Phos. 0.075% max)	73.00
Swedeland,Pa. A3 (Intermediate) (Phos. 0.036-0.075% max)	73.00
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Erie,Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
NevilleIsland,Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00

Steel Service Center Products

Representative prices, per pound, subject to extras, f.o.b. warehouse. City delivery charges are 15 cents per 100 lb except: Denver, Moline, Norfolk, Richmond, Washington, 20 cents; Baltimore, Boston, Los Angeles, New York, Philadelphia, Portland, Spokane, San Francisco, 10 cents; Atlanta, Birmingham, Chattanooga, Houston, Seattle, no change.

	SHEETS				STRIP	BARS			Standard Structural Shapes	PLATES	
	Hot-Rolled	Cold-Rolled	Galv. 10 Ga.†	Stainless Type 302	Hot-Rolled*	H.R. Rounds	C.F. Rds.‡	H.R. Alloy 4140††[5]		Carbon	Floor
Atlanta	8.59§	9.86§	10.13	....	8.91	9.39	13.21#	....	9.40	9.29	11.21
Baltimore	9.80[a]	10.00[a]	10.06	....	11.45[c]	10.05[d]	11.80#	16.38	9.55	9.90[c]	10.50
Birmingham	9.43[a]	10.20[a]	....	....	10.91[c]	9.59[d]	13.14#	16.76	9.00	9.79[c]	10.90
Boston	10.07	11.42	11.77	53.50	12.17	10.19	13.30#	15.64	10.64	10.27	11.95
Buffalo	8.40	9.60	11.25	55.98	8.75	9.15	11.45#	15.40	9.25	9.20	10.75
Chattanooga	8.35	9.69	9.65	....	8.40	8.77	10.46	....	8.98	8.80	10.66
Chicago	8.25	9.45	10.90	53.00	8.51	8.99	9.15	15.05	9.00	8.89	10.20
Cincinnati	8.43	9.51	10.95	53.43	8.93	9.31	11.58#	15.37	9.56	9.27	10.53
Cleveland	8.54[a]	8.79[b]	10.94	52.33	10.32[c]	8.75[d]	11.25#	15.16	9.39	8.71[c]	10.50[f2]
Dallas	8.80	9.30	....	....	8.85	8.80	....	....	8.75	9.15	10.40
Denver	9.40	11.84	12.94	....	9.43	9.80	11.19	....	9.84	9.76	11.06
Detroit	8.51	9.71	11.25	56.50	8.88	9.30	9.51	15.33	9.56	9.26	10.46
Erie, Pa.	8.35	9.45	9.95[10]	....	8.60	9.10	11.25	....	9.35	9.10	10.60
Houston	9.65[a]	9.65[b]	....	52.00	10.85[c]	8.90[d]	13.10#	16.55	8.35	9.65[c]	10.10
Jackson, Miss.	8.52	9.79	....	....	8.84	9.82	10.68	....	9.33	9.22	11.06
Los Angeles	8.70[3]	10.82[3]	12.20	57.60	9.15	9.10[3]	12.95[3]	16.35	9.00[3]	9.10[3]	11.30[3]
Memphis, Tenn.	8.59	9.80	....	....	8.84	9.32	11.25#	....	9.33	9.22	10.86
Milwaukee	8.39	9.59	11.04	....	8.65	9.13	9.39	15.19	9.22	9.03	10.34
Moline, Ill.	8.55	9.80	....	....	8.84	8.95	9.15	....	8.99	8.91	....
New York	9.17	10.49	11.35	53.08	9.64	9.99	13.25#	15.50	9.74	9.77	11.65
Norfolk, Va.	8.65	....	....	....	9.15	9.30	12.75	....	9.65	9.10	10.50
Philadelphia	8.20	9.55	10.89	52.17	9.25	9.40	11.95#	15.48	9.10	9.15	10.40**
Pittsburgh	8.54[a]	8.79[b]	10.76	52.33	10.30[c]	8.64[d]	11.25#	15.05	9.00	8.47[c]	10.26[f2]
Richmond, Va.	8.65	....	10.79	....	9.15	9.55	....	....	9.65	9.10	10.60
St. Louis	8.63	9.83	11.28	....	8.89	9.37	9.78	15.43	9.48	9.27	10.58
St. Paul	8.80[a]	9.31[b]	10.54	....	10.32[c]	8.70[d]	11.49#	16.54	9.38	8.60[c]	10.49
San Francisco	9.65	11.10	11.40	55.10	9.75	10.15	13.60	16.25	9.85	10.00	12.35
Seattle	10.30	11.55	12.50	56.52	10.25	10.50	14.70	16.80[3]	10.20	10.10	12.50
South'ton, Conn.	9.07	10.33	10.71	....	9.48	9.74	....	....	9.57	9.57	10.91
Spokane	10.30	11.55	12.50	57.38	10.75	11.00	14.70	16.80	10.20	10.10	13.00
Washington	9.15	....	....	....	9.65	10.05	12.50	....	10.15	9.60	11.10

*Prices do not include gage extras; †prices include gage and coating extras; ‡includes 35-cent bar quality extras; §42 in. and under; **¼ in. and heavier; ††as annealed; ‡‡⅝ in. to 4 in. wide, inclusive; #net price, 1 in. round C-1018.
[a]10 Ga.; [b]20 Ga.; [c]⅛ x 1 in.; [d]⅜-2½ in.; [e]¼ x 84 in.; [f]¼ x 36 in.
Base quantities, 2000 to 4999 lb except as noted; cold-finished bars, 2000 lb and over except in Seattle, 2000 to 3999 lb; stainless sheets, 8000 lb except in Chicago, New York, Boston, Seattle, 10,000 lb and in San Francisco, 2000 to 4999 lb; hot-rolled products on West Coast, 2000 to 9999 lb, except in Seattle, 30,000 lb and over; [3]—30,000 lb; [5]—1000 to 4999 lb; [2]—1000 to 1999 lb; [10]—2000 lb and over.



Scrap Marks Time Over Holidays

STEEL's index on heavy melting steel is unchanged at $41.33 a ton. Continued uncertainty over the steel labor situation is adding to the seasonal slackness

Scrap Prices, Page 104

● **Pittsburgh**—The market is inactive, but prices are steady. Major consumers are not expected to make any representative purchases before next month, so bids on factory bundles offered by General Motors' Fisher Body Div. will provide the next test of the market. Brokers think that the prices will show little change from last month's.

● **Chicago**—No new mill buying of scrap has occurred the last week or so, and prices are holding unchanged on a nominal basis. Observers feel the market will not be tested during the remainder of this year.

● **Philadelphia**—Demand is lagging as the yearend nears. No. 2 bundles are quoted lower at $26, delivered, and low phos structurals and plate is off to $49-$51. The January outlook for demand is clouded by the steel labor situation.

● **New York** — Brokers' buying prices are unchanged. The market is seasonally slow, and no pickup is expected until after the holidays.

● **Cleveland**—Little activity is expected in the market until after the holidays. Adding to the seasonal dullness is uncertainty over the labor situation. Mills are relying heavily on hot metal. In the absence of representative sales, quoted prices are nominal. Bids on monthend auto lists may show the trend of prices.

● **Detroit**—Prices continue to decline as dealers and brokers await the outcome of steel wage negotiations. A sale of ten or 12 carloads of No. 1 bundles was made at $38, off $4 from a similar sale the preceding week.

● **Buffalo**—The market undertone is easy, reflecting continued absence of buying interest by the mills. Prices, however, are holding. The mills have considerable scrap on hand and are not expected to return to the market actively until after the wage dispute is settled. Some cast iron scrap is moving to Canada.

● **Cincinnati**—Little new business is expected until after the turn of the year. Buying the last few days has been little more than a trickle. Prices are unchanged.

● **St. Louis**—Only slight changes in prices are noted in the absence of active demand. Mills are not anxious to buy, and the market is expected to drift until the steel labor situation is clarified.

● **Birmingham** — With mill and foundry consumers out of the market, and a large local electric furnace plant holding up shipments until after Jan. 1, practically no scrap is moving in this area. Limited buying by foundries in remote areas is noted. The export market is inactive.

● **Houston**—The market continues quiet. Lower prices are expected next month when the Lone Star mill enters the market. No purchases by the Houston mill are in prospect, and export requirements for the period are uncertain.

● **San Francisco**—Prices are holding in the local market despite the absence of large mill buying. A little inventory building is being done. Heavy exports are slated for Japan.

● **Los Angeles**—The market is at a standstill over the holidays. Prices are holding despite the absence of buying. No. 1 heavy melting is being offered at $40.

● **Seattle** — Brokers and dealers don't expect a definite market trend to develop until the steel labor dispute is settled. There is little activity, and prices are holding unchanged. The largest local consumer is reported buying limited tonnage of unprepared scrap.

Some export shipments from Portland, Oreg., additional to mill buying, are giving the market in that area the appearance of activity. Favorable labor costs at Portland serve to make that point popular for exports. The Portland mill is reported to be paying $40 for No. 1 heavy melting, $38 for No. 2. Mill buying and larger exports account for the higher Portland prices compared with those prevailing at Seattle.

Scrapmen report that Japan has purchased 59 cargoes for first quarter shipment. It will be moved largely from Gulf and West Coast ports. The deal is reported at a base price of $39. 40 per cent being No. 1 heavy melting, 40 per cent No. 2 heavy melting, and 20 per cent bundles.

Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including broker's commission, as reported to STEEL, Dec. 23, 1959. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Dec. 23	$41.33
Dec. 16	41.33
Nov. Avg.	44.33
Dec. 1958	39.47
Dec. 1954	32.58

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	41.00-42.00
No. 2 heavy melting	35.00-36.00
No. 1 dealer bundles	42.00-43.00
No. 2 bundles	30.00-31.00
No. 1 busheling	41.00-42.00
No. 1 factory bundles	51.00-52.00
Machine shop turnings	22.00-23.00
Mixed borings, turnings	22.00-23.00
Shovel turnings	*32.00-33.00*
Cast iron borings	*32.00-33.00*
Cut structurals:	
2 ft and under	49.00-50.00
3 ft and under	48.00-49.00
Heavy turnings	35.00-36.00
Punchings & plate scrap	54.00-55.00
Electric furnace bundles	52.00-53.00

Cast Iron Grades

No. 1 cupola	50.00-51.00
Stove plate	46.00-47.00
Unstripped motor blocks	32.00-33.00
Clean auto cast	47.00-48.00
Drop broken machinery	54.00-55.00

Railroad Scrap

No. 1 R. R. heavy melt	51.00-52.00
Rails, 2 ft and under	66.00-67.00
Rails, 18 in. and under	65.00-66.00
Random rails	61.00-62.00
Angles, splice bars	56.00-57.00
Railroad specialties	58.00-59.00
Rails, rerolling	66.00-67.00

Stainless Steel Scrap

18-8 bundles & solids	230.00-235.00
18-8 turnings	*120.00-125.00*
430 bundles & solids	125.00-130.00
430 turnings	55.00-65.00

CHICAGO

No. 1 hvy melt., indus	41.00-42.00
No. 1 hvy melt., dealer	39.00-40.00
No. 2 hvy melting	34.00-36.00
No. 1 factory bundles	*44.00-45.00*
No. 1 dealer bundles	40.00-41.00
No. 2 bundles	25.00-27.00
No. 1 busheling, indus.	43.00-44.00
No. 1 busheling, dealer	40.00-41.00
Machine shop turnings	22.00-23.00
Mixed borings, turnings	24.00-25.00
Shovel turnings	24.00-25.00
Cast iron borings	24.00-25.00
Cut structurals, 3 ft	48.00-49.00
Punchings & plate scrap	50.00-51.00

Cast Iron Grades

No. 1 cupola	54.00-55.00
Stove plate	48.00-49.00
Unstripped motor blocks	46.00-47.00
Clean auto cast	60.00-61.00
Drop broken machinery	60.00-61.00

Railroad Scrap

No. 1 R.R. heavy melt.	44.00-45.00
R.R. malleable	62.00-63.00
Rails, 2 ft and under	59.00-60.00
Rails, 18 in. and under	60.00-61.00
Angles, splice bars	54.00-55.00
Axles	58.00-60.00
Rails, rerolling	61.00-62.00

Stainless Steel Scrap

18-8 bundles, solids	220.00-225.00
18-8 turnings	115.00-120.00
430 bundles & solids	115.00-120.00
430 turnings	55.00-60.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*35.00-36.00*
No. 2 heavy melting	*24.00-25.00*
No. 1 bundles	*37.00-38.00*
No. 2 bundles	*22.00-23.00*
No. 1 busheling	*34.00-35.00*
Machine shop turnings	*12.00-13.00*
Mixed borings, turnings	*13.00-14.00*
Shovel turnings	*14.00-15.00*

Cast Iron Grades

No. 1 cupola	*45.00-46.00*
Stove plate	*39.00-40.00*
Heavy breakable	*39.00-40.00*
Unstripped motor blocks	*31.00-32.00*
Charging box cast	*39.00-40.00*
Clean auto cast	*52.00-53.00*

CLEVELAND

No. 1 heavy melting	40.00-41.00
No. 2 heavy melting	33.00-34.00
No. 1 factory bundles	46.00-47.00
No. 1 bundles	42.00-43.00
No. 2 bundles	26.00-27.00
No. 1 busheling	44.00-45.00
Machine shop turnings	16.00-17.00
Shovel turnings	22.00-23.00
Mixed borings, turnings	22.00-23.00
Cast iron borings	22.00-23.00
Cut foundry steel	42.00-43.00
Cut structurals, plate 2 ft and under	49.00-50.00
Low phos. punchings & plate	45.00-46.00
Alloy free, short shovel turnings	23.00-24.00
Electric furnace bundles	46.00-47.00

Cast Iron Grades

No. 1 cupola	55.00-56.00
Charging box cast	43.00-44.00
Heavy breakable cast	41.00-42.00
Stove plate	49.00-50.00
Unstripped motor blocks	39.00-40.00
Brake shoes	39.00-40.00
Clean auto cast	58.00-59.00
Burnt cast	47.00-48.00
Drop broken machinery	58.00-59.00

Railroad Scrap

R.R. malleable	64.00-65.00
Rails, 2 ft and under	65.00-66.00
Rails, 18 in. and under	66.00-67.00
Rails, random lengths	59.00-60.00
Cast steel	53.00-54.00
No. 1 railroad cast	58.50-59.50
Railroad specialties	57.00-58.00
Angles, splice bars	57.00-58.00
Rails, rerolling	74.00-75.00

Stainless Steel (Brokers' buying prices: f.o.b. shipping point)

18-8 bundles, solids	210.00-215.00
18-8 turnings	110.00-115.00
430 clips, bundles, solids	115.00-120.00
430 turnings	45.00-55.00

YOUNGSTOWN

No. 1 heavy melting	43.00-44.00
No. 2 heavy melting	36.00-37.00
No. 1 busheling	47.00-48.00
No. 1 bundles	45.00-46.00
No. 2 bundles	29.00-30.00
Machine shop turnings	18.00-19.00
Shovel turnings	23.00-24.00
Cast iron borings	23.00-24.00
Low phos.	48.00-49.00
Electric furnace bundles	48.00-49.00

Railroad Scrap

No. 1 R.R. heavy melt.	46.00-47.00

BUFFALO

No. 1 heavy melting	37.00-38.00
No. 2 heavy melting	33.00-34.00
No. 1 bundles	37.00-38.00
No. 2 bundles	27.00-28.00
No. 1 busheling	37.00-38.00
Shovel turnings	24.00-25.00
Machine shop turnings	20.00-21.00
Cast iron borings	22.00-23.00
Low phos structurals and plate, 2 ft and under	45.00-46.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	47.00-48.00
No. 1 machinery	51.00-52.00

Railroad Scrap

Rails, random lengths	47.00-48.00
Rails, 3 ft and under	53.00-54.00
Railroad specialties	45.00-46.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	36.00-37.00
No. 2 heavy melting	30.50-31.50
No. 1 bundles	36.00-37.00
No. 2 bundles	25.00-26.00
No. 1 busheling	36.00-37.00
Machine shop turnings	20.00-21.00
Mixed borings, turnings	20.00-21.00
Shovel turnings	22.00-23.00
Cast iron borings	21.00-22.00
Low phos 18 in.	49.00-50.00

Cast Iron Grades

No. 1 cupola	49.00-50.00
Heavy breakable cast	44.00-45.00
Charging box cast	44.00-45.00
Drop broken machinery	59.00-60.00

Railroad Scrap

No. 1 R. R. heavy melt.	44.00-45.00
Rails, 18 in. and under	63.00-64.00
Rails, random lengths	54.00-55.00

PHILADELPHIA

No. 1 heavy melting	42.00
No. 2 heavy melting	35.00
No. 1 bundles	46.00
No. 2 bundles	*26.00*
No. 1 busheling	46.00
Electric furnace bundles	49.00
Mixed borings, turnings	21.00-22.00†
Shovel turnings	27.00
Machine shop turnings	23.00
Heavy turnings	35.00†
Structurals & plates	*49.00-51.00*
Couplers, springs wheels	51.00
Rail crops, 2 ft & under	66.00-68.00

Cast Iron Grades

No. 1 cupola	45.00
Heavy breakable cast	47.00
Drop broken machinery	54.00-55.00
Malleable	68.00

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	36.00-37.00
No. 2 heavy melting	32.00-33.00
No. 1 bundles	36.00-37.00
No. 2 bundles	20.00-21.00
Machine shop turnings	11.00-12.00
Mixed borings, turnings	14.00-15.00
Shovel turnings	15.00-16.00
Low phos. structurals & plates	39.00-40.00

Cast Iron Grades

No 1 cupola	38.00-39.00
Unstripped motor blocks	25.00-26.00
Heavy breakable	37.00-38.00

Stainless Steel

18-8 sheets, clips, solids	200.00-205.00
18-8 borings, turnings	85.00-90.00
410 sheets, clips, solids	55.00-60.00
430 sheets, clips, solids	85.00-90.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	35.00-36.00
No. 2 heavy melting	25.50-26.50
No. 1 bundles	35.00-36.00
No. 1 busheling	35.00-36.00
Machine shop turnings	11.00-12.00
Shovel turnings	15.00-16.00
No. 1 cast	39.00-40.00
Mixed cupola cast	37.00-38.00
No. 1 machinery cast	40.00-43.00

BIRMINGHAM

No. 1 heavy melting	36.00-37.00
No. 2 heavy melting	31.00-32.00
No. 1 bundles	36.00-37.00
No. 2 bundles	24.00-25.00
No. 1 busheling	40.00-41.00
Cast iron borings	14.00-15.00
Machine shop turnings	23.00-24.00
Shovel turnings	25.00-26.00
Bar crops and plate	44.00-45.00
Structurals & plates	43.00-44.00
Electric furnace bundles	40.00-41.00
Electric furnace:	
3 ft and under	39.00-40.00
2 ft and under	38.00-39.00

Cast Iron Grades

No. 1 cupola	53.00-54.00
Stove plate	53.00-54.00
Charging box cast	29.00-30.00
Unstripped motor blocks	42.00-43.00
No. 1 wheels	44.00-45.00

Railroad Scrap

No. 1 R.R. heavy melt.	36.00-37.00
Rails, 18 in. and under	56.00-57.00
Rails, rerolling	61.00-62.00
Rails, random lengths	52.00-53.00
Angles, splice bars	49.00-50.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	35.00-37.00
No. 2 heavy melting	33.00-34.00
No. 1 bundles	42.00
No. 2 bundles	*25.00*
No. 1 busheling	42.00
Machine shop turnings	*19.00*
Shovel turnings	*21.00*

Cast Iron Grades

No. 1 cupola	53.00
Charging box cast	46.00
Heavy breakable cast	44.00
Unstripped motor blocks	45.00
Clean auto cast	56.00
Stove plate	*45.00*

Railroad Scrap

No. 1 R.R. heavy melt.	45.00
Rails, 18 in. and under	56.00
Rails, random lengths	50.00
Rails, rerolling	65.00
Angles, splice bars	50.00

HOUSTON

(Exporters' buying prices; f.a.s.)

No. 1 heavy melting	*38.00-39.00*
No. 2 heavy melting	*35.00-36.00*
No. 2 bundles	26.50-27.50

(Brokers' buying prices; f.o.b. cars)

No. 1 heavy melting	34.00†
No. 2 heavy melting	31.00†
No. 1 bundles	34.00
No. 2 bundles	20.00†
Machine shop turnings	17.00
Shovel turnings	20.00
Low phos. plates & structurals	48.00

Cast Iron Grades

No. 1 cupola	*47.00*
Heavy breakable	35.00
Foundry malleable	43.00-44.00
Unstripped motor blocks	38.50-39.50

Railroad Scrap

No. 1 R.R. heavy melt.	38.00-39.00

LOS ANGELES

(Brokers' buying prices)

No. 1 heavy melting	*40.00*
No. 2 heavy melting	39.00
No. 1 bundles	37.00
No. 2 bundles	21.00
Machine shop turnings	18.00
Shovel turnings	18.00
Cast iron borings	18.00
Cut structurals and plate 1 ft and under	48.00

Cast Iron Grades

No. 1 cupola	47.00

Railroad Scrap

No. 1 R.R. heavy melt.	39.00

PORTLAND, OREG.

(Brokers' buying prices)

No. 1 heavy melting	40.00-41.00
No. 2 heavy melting	36.00-38.00
No. 1 bundles	36.00
No. 2 bundles	25.00-26.00
Shovel turnings	22.00
Electric furnace bundles	42.00-44.00

Cast Iron Grades

No. 1 cupola	40.00-42.00
Heavy breakable	35.00
Unstripped motor blocks	31.00
Stove plate	21.00

SEATTLE

No. 1 heavy melting	35.00†
No. 2 heavy melting	32.00-33.00
No. 1 bundles	32.00-33.00
No. 2 bundles	22.00†
Machine shop turnings	17.00†
Mixed borings, turnings	17.00†
Electric furnace No. 1	*42.00-43.00*

Cast Iron Grades

No. 1 cupola	34.00†
Heavy breakable cast	28.00†
Unstripped motor blocks	26.00†
Stove plate (f.o.b. plant)	21.00†

SAN FRANCISCO

No. 1 heavy melting	40.00
No. 2 heavy melting	36.00
No. 1 bundles	36.00
No. 2 bundles	22.00
Machine shop turnings	16.00
Mixed borings, turnings	16.00
Cast iron borings	16.00
Heavy turnings	16.00
Shovel turnings	16.00
Cut structurals, 3 ft	44.00

Cast Iron Grades

No. 1 cupola	48.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	40.00
No. 1 wheels	34.00

HAMILTON, ONT.

(Brokers' buying prices)

No. 1 heavy melting	32.25
No. 2 heavy melting	28.25
No. 1 bundles	32.25
No. 2 bundles	24.00
Mixed steel scrap	24.25
Mixed borings, turnings	13.00
Busheling, new factory: Prepared	32.25
Unprepared	26.25
Shovel turnings	17.00

Cast Iron Grades†

No. 1 machinery cast	46.50-48.00

•Delivered to docks.
†Nominal.
‡F.o.b. Hamilton, Ont.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 98 & 99

While the holidays are slowing consumption, the pressure on the sheet mills for deliveries is unabated. Consumers are anxious to take in as much tonnage as they can get before the Jan. 26 expiration date of the Taft-Hartley injunction.

In event of a settlement of the labor dispute before the Jan. 26 deadline, it would not surprise some steelmen if they'd lose some of the tonnage they've booked. It's thought some customers have placed duplicate orders in an effort to assure themselves heavy deliveries over the next few weeks.

Because inventories are low, users will take all the tonnage they can lay their hands on. But once their urgent requirements are satisfied and they're assured of uninterrupted steel production, they'll probably scale down their second quarter commitments, or ask that tonnage deliveries be stretched out over a longer period.

Cold rolled and galvanized sheets still head the list of critically needed items. Leading makers say they can't take any additional tonnage for the first half of next year, and suppliers generally are allocating shipments on the basis of past buying patterns.

Distributors . . .

Prices, Page 102

Steel service centers report a continued decline in inventories. They report that sheets and bars are causing them more headaches than other products. Since the strike's end, one firm has received big tonnages of plates and structurals on orders which were tagged for shipment prior to the strike.

It is expected that first quarter receipts from mills will be 25 per cent higher than in the first quarter of 1959. At the same time, it is anticipated that sales in the first quarter will top those of the like period this year. For the full year, a gain of close to 20 per cent in business is forecast.

Pig Iron . . .

Pig Iron Prices, Page 102

Merchant pig iron stocks are plentiful. Some suppliers will idle capacity due to lack of demand and a few will not reactivate the furnaces until the steel labor problem is resolved.

Currently, consumption by foundries is off seasonally. Another month should witness a good rebound.

Foreign pig iron is in general use in the Pacific Northwest. Imports to that area from Australia and South Africa are on order as much as six months in advance. Prices are about $16 a ton under domestic levels.

Iron Ore . . .

Iron Ore Prices, Page 110

Steelmakers think iron ore supplies, supplemented with rail shipments from the head of the lakes and imports, will be sufficient to support production until ore begins to flow down the lakes again next spring.

The poststrike movement fell short of hopes because of adverse weather that hampered loading. But the movement was substantial. The total for November (December figures are not available) was 5,310,759 gross tons vs. 4,528,563 in November, 1958, and 4,066,257 in November, 1957. The 1959 season's total to Dec. 1 was 43,541,344 gross tons vs. 52,792, 715 to that date in 1958, and 84,595,236 in 1957.

Imports in September amounted to 3,801,252 gross tons, bringing the nine-month total to 24,879,435 tons. Imports were from:

IRON ORE IMPORTS

(Gross tons)

Source:	September, 1959	First Nine Months
Brazil	88,177	885,718
British W. Africa	.....	38,101
Canada	1,905,085	9,267,270
Chile	236,389	2,643,478
Cuba	.....	1,600
Denmark	49	358
Dominican Republic	.....	50,370
Iran	2,756	2,756
Liberia	72,280	804,326
Mexico	.....	77,878
Peru	194,239	1,267,183
Philippines	.....	53,998
Spain	.....	209
Surinam	.....	2,320
Sweden	19,438	42,025
United Kingdom	.....	18,954
Venezuela	1,282,839	9,722,891
Totals	3,801,252	24,879,435

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 110

The coke market is steady, though some tightening in oven coke supply is reported. For the most part, though, foundries are having little trouble getting in sufficient tonnage to meet their needs. Pittsburgh area buyers are reported reaching out into other districts for supplies.

Structural Shapes . . .

Structural Shape Prices, 97

Structural steel orders are coming to fabricators at a slow rate. Some shops think there'll be a substantial pickup after the turn of the year only if there's a settlement of the steel labor dispute.

Plain material is coming in from the mills more freely, but shop operations are hampered by lack of balanced steel supplies. Most fabricators are able to operate one full shift, and on that basis they have sufficient work ahead to keep them occupied for five to six months, on the average.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

550 tons, galvanized transmission towers, Priest Rapids power project, Ephrata, Wash., to Pacific Coast Div., Bethlehem Steel Co., Seattle; R. C. Hughes, Spokane, Wash., general contractor.

350 tons, Marple-Newton Junior High School, Delaware County, Pennsylvania, to Trojan Steel Corp.

158 tons, dormitory, Ft. Greely project, Alaska, to Columbia Steel & Iron, Portland.

(*Please turn to Page* 109)

"Samson" Shot
(chilled iron)
"Angular" Grit
ANGULAR GRIT
AMERICA'S LEADING METAL ABRASIVES
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TRU-STEEL SHOT
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Metalmen See '60 Upswing

Sales and production will increase. Titanium, lead, magnesium, and nickel will show improvement. Prices should be stable over the year. Little labor strife expected

Nonferrous Metal Prices, Pages 108 & 109

THE COMING 12 months will be a period of higher level activity for the nonferrous industry. Metalmen expect: Bigger sales, higher production, greater price stability, few labor difficulties.

• **'59 Was Up**—Despite the steel strike, which affected almost every company's business, and the industry's own lengthy labor squabbles, 1959 has been a year of great improvement. Most metal companies rode the wave of the economic recovery well enough to post sales and profits better than 1958's or 1957's.

Looking ahead to 1960, here is what forecasters see:

• **Titanium: Up a Little**—Still dependent on the military aircraft market, the industry hopes to make further penetrations in civilian fields, such as chemical processing, where industry leaders are convinced the metal's future lies.

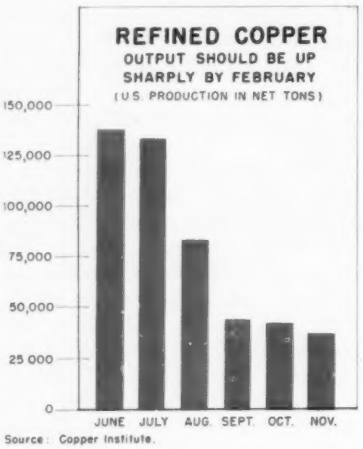
A recent Defense Department decision to cut back drastically on the B-70 bomber (still in the development stage) and hold production of B-52 bombers at about the 1959 level has caused earlier estimates of 1960's shipments to be upgraded.

Now industry forecasters expect: Sponge output slightly above the 3700 tons produced this year, probably about 4000 tons; mill product output and shipments in the neighborhood of 3500 tons compared with about 3100 tons in 1959. Look for further drops in mill products prices.

• **Magnesium: Sharp Climb** — The metal has been kept off balance by the fickleness of the military market on which it has been traditionally dependent. Now that there are two primary producers, look for them to push development and promote more civilian applications.

Forecasts peg 1960 primary metal sales about 20 per cent above the 1959 level. Primary production should hit around 40,000 tons.

Magnesium casting shipments will be reasonably good this year, and wrought product shipments will be the second best in history. In 1960 use of wrought forms of magnesium may surpass tonnage for castings for the first time, predicts the Magnesium Association.



Source: Copper Institute.

Prices should remain stable throughout the year.

• **Lead: Slightly Better**—Lead has had some excellent business sporadically, but customers have bought only sparingly in recent months.

Look for this pattern in 1960: Slow sales during the early part of the year with a pickup beginning in the spring. Net result: An improvement in consumption of 4 to 5 per cent, with tonnage in the neighborhood of 1,150,000.

Output should be up sharply from the low level of 1959 (mine production was the lowest in 60 years). U. S. refined production will be slightly over 1 million tons compared with about 865,000 tons in 1959. Foreign producers will probably ship around 350,000 tons of metal, ores, and concentrates to this country for consumption, the maximum amount allowable under the quota system. Imports of manufactured lead goods (litharge, pipe, sheets), which aren't covered by quotas, will probably exceed the 20,000 tons brought in this year, unless the government heeds the plea of domestic companies which have petitioned to have the flow curtailed.

Prices may dip beneath the current 12 cents a pound (effective Dec. 21) during the first part of the year, then rise gradually, ending up the year at about 13 cents.

• **Nickel: Boom Continues**—The industry has made a fast comeback from the recession doldrums of 1958 and 1957. Despite the steel strike (high alloy steelmakers are nickel's best customers), the industry had an excellent year, virtually doubling sales.

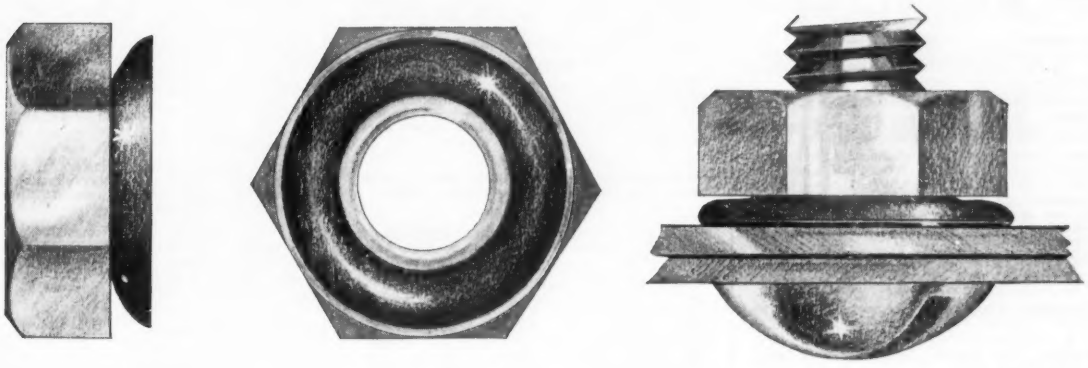
Next year should be even better. Expect Free World consumption to be well over this year's 200,000 tons. Prices shouldn't go up during the year.

NONFERROUS PRICE RECORD

	Dec. 22 Price	Last Change	Previous Price	Nov. Avg	Oct. Avg	Dec., 1958 Avg
Aluminum	26.00	Dec. 17, 1959	24.70	24.700	24.700	24.700
Copper	33.00	Nov. 12, 1959	31.50	32.420	31.278	28.856
Lead	11.80	Dec. 21, 1959	12.30	12.800	12.800	12.800
Magnesium	35.25	Aug. 13, 1956	33.75	35.250	35.250	35.250
Nickel	74.00	Dec. 6, 1956	64.50	74.000	74.000	74.000
Tin	99.125	Dec. 17, 1959	98.875	100.985	102.231	99.019
Zinc	12.50	Nov. 2, 1959	12.50-13.00	12.500	12.250	11.500

Quotations in cents per pound based on: COPPER, mean of primary and secondary, deld. Conn. Valley; LEAD, common grade, deld. St. Louis; ZINC, prime western, E. St. Louis; TIN, Straits, deld. New York; NICKEL, electrolytic cathodes, 99.9%, base size at refinery, unpacked; ALUMINUM, primary pig, 99.5+%, f.o.b. customer custody; MAGNESIUM, pig 99.8%, Velasco, Tex.

NEW TENZ-NUT®



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Now — a spring washer preassembled on a hex nut — to save time in all types of assembly operations where the tested principle of bolt, nut and spring washer are required. Developed by Eaton-Reliance, this new fastener is now available for production use.

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Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, pigs, 26.00; ingots, 27.10, 30,000 lb or more, f.o.b. customer custody.

Aluminum Alloy: No. 13, 29.90; No. 43, 29.70; No. 195, 30.70; No. 214, 31.50; No. 356, 28.60; 30 or 40 lb ingots.

Antimony: R.M.M. brand, 99.5%, 29.00; Lone Star brand, 29.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 24.50-25.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $71.50 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $74.75 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.40 per lb deld.

Cobalt: 99+%, $1.75 per lb for 500-lb keg, $1.77 per lb for 100 lb case; $1.82 per lb under 100 lb.

Columbium: Powder, $55-85 per lb nom.

Copper: Electrolytic, 33.00 deld.; custom smelters, nom.; lake, 33.00 deld.; fire refined, 32.75 deld.

Germanium: First reduction, less than 1 kg, 38.30 per gram; 1-10 kg, 33.30 per gram; 10 kg or more, 31.30 per gram; intrinsic grade, 33.30-35.30 per gram.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $75-80 per troy oz nom.

Lead: Common, 11.80; chemical, 11.90; corroding, 11.90, St. Louis. New York basis, add 0.20.

Lithium: 1 lb or 2 lb ingots, less than 50 lb, $11 per lb, f.o.b. Minneapolis; 50-99 lb, $10; 100-499 lb, $9.50; 500 lb or more, $9 per lb, delivered.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex.; 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.

Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75, f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $212-214 per 75 lb flask.

Molybdenum: Unalloyed forging billets, 4.125-7.0 in. diam., 50-4999 lb, $8.15-11.50 per lb, depending on quantity; 5000 lb or more, $8 per lb, f.o.b. Coldwater, Mich.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot for addition to cast iron, 74.50; "F" nickel, 5 lb ingots in kegs for addition to cast iron, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01. Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel, 69.60.

Osmium: $70-100 per troy oz nom.

Palladium: $22-24 per troy oz.

Platinum: $77-80 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $122-125 per troy oz.

Ruthenium: $55-60 per troy oz.

Selenium: $7.00 per lb, commercial grade.

Silver: Open market, 91.375 per troy oz.

Sodium: Solid pack, c.l., 19.50; l.c.l., 20.00; brick, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.

Tantalum: Melting stock, $35 per lb; rod, $60 per lb nom.; sheet, $55 per lb nom.

Tellurium: $2.50 per lb.

Thallium: $7.50 per lb.

Tin: Straits, N. Y., spot and prompt, 99.125.

Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max.), $1.60 per lb; grade A-2 (0.5% Fe max.), $1.50 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 1000-lb lots, $2.75-2.90 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00; 99+% hydrogen reduced, $3.10-4.00.

Zinc: Prime western, 12.50; brass special, 12.75; intermediate, 13.00, East St. Louis, freight allowed over 0.50 per lb. New York basis, add 0.50. High grade, 13.75; special high grade, 14.00 deld. Diecasting alloy ingot No. 3, 15.75; No. 2, 16.25; No. 5, 16.00 deld.

Zirconium: Reactor grade sponge, 100 lb or less, $8 per lb; 100-500 lb, $7.00 per lb; over 500 lb, $6.50 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 27.25-29.00; No. 12 foundry alloy (No. 2 grade), 25.00-25.25; 5% silicon alloy, 0.60 Cu max., 26.25; 13 alloy, 0.60 Cu max., 26.25; 195 alloy, 28.00-28.75; 108 alloy, 25.50-25.75. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 25.75; grade 2, 24.50; grade 3, 23.50; grade 4, 22.75.

Brass Ingot: Red brass, No. 115, 30.75; tin bronze, No. 225, 41.50; No. 245, 36.00; high-leaded tin bronze, No. 305, 35.25; No. 1 yellow, No. 405, 24.75; manganese bronze, No. 421, 29.25.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.975, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.955, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 38.35; l.c.l., 38.98. Weatherproof, 20,000-lb lot, 38.55; l.c.l., 39.30.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $17.50 per cwt; pipe, full coils, $17.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheet and strip, $7.25-17.00; sheared mill plate, $5.25-10.00; wire, $5.55-9.50; forging billets, $3.20-4.75; hot-rolled and forged bars, $4.00-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 26.00; ribbon zinc in coils, 21.50; plates, 20.00.

ZIRCONIUM

Plate, $12.50-19.20; H.R. strip, $12.50-22.90; C.R. strip, $15.90-31.25; forged or H.R. bars, $11.00-17.40.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	138	120	138
Strip, C.R.	124	108	138
Plate, H.R.	130	110	126
Rod, Shapes, H.R.	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

(Prices do not yet reflect latest increases. Please check Jan. 4, 1960 issue.)

Sheets: 1100, 3003, and 5005 mill finish (30,000 lb base; freight allowed).

Thickness Range Inches	Flat Sheet	Coiled Sheet
0.250-0.136	42.80-47.30	.....
0.136-0.096	43.20-48.30	.....
0.126-0.103	.....	39.20-39.80
0.096-0.077	43.80-50.00	39.30-40.00
0.077-0.068	44.30-52.20	.....
0.077-0.061	.....	39.50-40.70
0.068-0.061	44.30-52.20	.....
0.061-0.048	44.90-54.40	40.10-41.80
0.048-0.038	45.40-57.10	40.60-43.20
0.038-0.030	45.70-62.00	41.00-45.70
0.030-0.024	46.20-53.70	41.30-45.70
0.024-0.019	46.90-56.80	42.40-44.10
0.019-0.017	47.70-54.10	43.00-44.70
0.017-0.015	48.60-55.00	43.80-45.50
0.015-0.014	46.60	48.80-46.50
0.014-0.012	50.80	45.50
0.012-0.011	51.00	46.70
0.011-0.0095	53.50	48.10
0.0095-0.0085	54.60	49.60
0.0085-0.0075	56.20	50.85
0.0075-0.007	57.70	52.30
0.007-0.006	59.30	53.70

ALUMINUM (continued)

Plates and Circles: Thickness 0.250-3 in.

Alloy	Plate Base	Circle Base
24-60 in. width or diam., 72-240 in. lengths		
1100-F, 3003-F	42.40	47.20
5050-F	43.50	48.30
3004-F	44.50	50.20
5052-F	45.10	50.90
6061-T6	45.60	51.70
2024-T4	49.30	56.10
7075-T6*	57.60	64.70

*24-48 in. width or diam., 72-180 in. lengths.

Screw Machine Stock: 30,000 lb base.

Diam. (in.) or across flats*	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
0.125	76.90	73.90	....	....
0.250	62.00	60.20	89.10	76.60
0.375	61.20	60.00	73.50	68.50
0.500	61.20	60.00	73.50	68.50
0.625	61.20	60.00	69.80	64.20
0.750	59.70	58.40	63.60	60.40
0.875	59.70	58.40	63.60	60.40
1.000	59.70	58.40	63.60	60.40
1.125	57.30	56.10	61.50	58.30
1.250	57.30	56.10	61.50	58.30
1.530	57.30	56.10	61.50	58.30
1.500	57.30	56.10	61.50	58.30
1.625	75.00	53.60	....	56.20
1.750	55.00	53.60	60.30	56.20
1.875	55.00	53.60	....	56.20
2.000	55.00	53.60	60.30	56.20
2.125	53.50	52.10	....	....
2.250	53.50	52.10	....	56.20
2.375	53.50	52.10	....	....
2.500	53.50	52.10	....	56.20
2.625	....	50.40	....	....
2.750	51.90	50.40	....	56.20
2.875	....	50.40	....	....
3.000	51.90	50.40	....	56.20
3.125	....	50.40	....	....
3.250	....	50.40	....	....
3.375	....	50.40	....	....

*Selected sizes.

Forging Stock: Round, Class 1, random length diam., 0.375-8 in., "F" temper; 2014, 42.20-55.00; 6061, 41.60-55.00; 7075, 61.60-75.00; 7070, 66.60-80.00.

Pipe: ASA schedule 40, alloy 6063-T6 standard length, plain ends, 90,000 lb base, dollars per 100 ft. Nominal pipe sizes: ⅜ in., 18.85; 1 in., 29.75; 1¼ in., 40.30; 1½ in., 48.15; 2 in., 58.30; 4 in., 160.20; 6 in., 287.55; 8 in., 432.70.

Extruded Solid Shapes:

Factor	Alloy 6063-T5	Alloy 6062-T6
9-11	42.70-44.20	51.30-55.50
12-14	42.70-44.20	52.00-56.50
15-17	42.70-44.20	53.20-58.20
18-20	43.20-44.70	55.20-60.80

MAGNESIUM

Sheets and Plate: AZ31B standard grade, .032 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.80; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24-72 in. widths; .125 in., 74.90; .188 in., 71.70-72.10; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.0 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grade (AZ31B)
6-8	65.30-67.60	84.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-105.30

NONFERROUS SCRAP

DEALERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 24.75-25.25; No. 2 heavy copper and wire, 21.75-22.25; light copper, 20.25-20.75; No. 1 composition red brass, 18.50-18.75; No. 1 com-

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES e (Based on copper at 33.00c)		
	Sheets, Strip, Plate	Rod	Wire	Seamless Tubes	Clean Heavy	Rod Ends	Clean Turnings
Copper	57.13b	54.86c	....	58.32	29.000	29.000	28.250
Yellow Brass	50.57	36.06d	50.86	54.23	22.250	21.250	20.250
Low Brass, 80%	53.53	53.22	53.82	57.09	24.750	24.500	24.000
Red Brass, 85%	54.58	54.27	54.87	58.14	25.750	25.500	25.000
Com. Bronze, 90%	56.17	55.86	56.46	59.48	26.750	26.500	26.000
Manganese Bronze	58.86	52.21	62.69	....	20.875	20.625	19.875
Muntz Metal	53.20	48.26	....	....	20.875	20.625	20.125
Naval Brass	55.12	48.68	61.43	58.78	20.750	20.500	20.000
Silicon Bronze	62.86	61.80	62.15	80.79	28.375	28.125	27.375
Nickel Silver, 10%	65.98	68.06	68.06	....	26.875	26.625	14.937
Phos. Bronze	77.44	78.19	77.69	79.37	29.875	29.625	28.625

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb.

position turnings, 17.25-17.75; new brass clippings, 16.00-16.50; light brass, 12.25-12.50; heavy yellow brass, 13.25-13.75; new brass rod ends, 14.00-14.50; auto radiators, unsweated, 14.50-15.00; cocks and faucets, 15.50-16.00; brass pipe, 15.75-16.20.

Lead: Soft scrap lead, 8.00-8.50; battery plates, 3.50-3.75; linotype and stereotype, 9.00-9.50; electrotype, 7.25-7.75; mixed babbitt, 9.50-10.00.

Monel: Clippings, 29.00-31.00; old sheets, 25.00-27.00; turnings, 20.00-22.00; rods, 29.00-31.00.

Nickel: Sheets and clips, 52.00-54.00; rolled anodes, 52.00-54.00; turnings, 39.00-40.00; rod ends, 52.00-54.00.

Zinc: Old zinc, 4.25-4.75; new diecast scrap, 4.00-4.25; old diecast scrap, 2.50-2.75.

Aluminum: Old castings and sheets, 11.00-11.50; clean borings and turnings, 7.00-7.50; segregated low copper clips, 15.00-15.50; segregated high copper clips, 14.00-14.50; mixed low copper clips, 14.50-15.00; mixed high copper clips, 12.50-13.00.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 12.75-13.25; clean borings and turnings, 10.00-10.50; segregated low copper clips, 16.75-17.25; segregated high copper clips, 16.00-16.50; mixed low copper clips, 16.00-16.50; mixed high copper clips, 15.50-16.00.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 11.50-11.75; clean borings and turnings, 10.50-11.00; segregated low copper clips, 15.75-16.25; segregated high copper clips, 14.75-15.25; mixed low copper clips, 15.25-15.75; mixed high copper clips, 14.25-14.75.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delevered refinery)

Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 59.00; light scrap, 54.00; turnings and borings, 39.00.

Copper and Brass: No. 1 heavy copper and wire, nom.; No. 2 heavy copper and wire, 26.50; light copper, 23.00; refinery brass (60% copper) dry copper content, 24.25.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, nom.; No. 2 heavy copper and wire, 25.50; light copper, 23.00; No. 1 composition borings, 22.50; No. 1 composition solids, 23.00; heavy yellow brass solids, 17.00; yellow brass turnings, 16.00; radiators, 17.50.

PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.40.

Copper: Flat-rolled, 50.04; oval, 48.00; 5000-10,000 lb; electrodeposited, 42.50, 2000-5000 lb lots; cast, 45.00, 5000-10,000 lb quantities.

Nickel: Depolarized, less than 100 lb, 114.25; 100-499 lb, 112.00; 500-4999 lb, 107.50; 5000-29,999 lb, 105.25; 30,000 lb, 103.00. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 117.50; 200-499 lb, 116.00; 500-999 lb, 115.50; 1000 lb or more, 115.00.

Zinc: Balls, 19.75; flat tops, 19.75; flats, 22.50; ovals, 21.75, ton lots.

CHEMICALS

Cadmium Oxide: $1.40 per lb in 100-lb drums.

Chromic Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.50; 10,000-20,000 lb, 30.00; 20,000 lb or more, 29.50.

Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,900 lb, 61.90.

Copper Sulphate: 100-1900 lb, 16.00; 2000-5900 lb, 14.00; 6000-11,900 lb, 13.75; 12,000-22,900 lb, 13.50; 23,000 lb or more, 13.00.

Nickel Chloride: 100 lb, 45.00; 200 lb, 43.00; 300 lb, 42.00; 400-4900 lb, 40.00; 5000-9900 lb, 38.00; 10,000 lb or more, 37.00.

Nickel Sulphate: 5000-22,999 lb, 29.00; 23,000-39,990 lb, 28.50; 40,000 lb or more, 28.00.

Sodium Cyanide (Cyanobrik): 200 lb, 23.80; 400-800 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.

Sodium Stannate: Less than 100 lb, 78.00; 100-600 lb, 68.80; 700-1900 lb, 66.00; 2000-9900 lb, 64.10; 10,000 lb or more, 62.80.

Stannous Chloride (Anhydrous): 25 lb, 153.20; 100 lb, 148.30; 400 lb, 145.90; 800-19,900 lb, 105.00; 20,000 lb or more, 98.90.

Stannous Sulphate: Less than 50 lb, 138.40; 50 lb, 108.40; 100-1900 lb, 106.40; 2000 lb or more, 104.40.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(Concluded from Page 105)

Oreg.; Sound Construction & Engineering Co., Seattle, general contractor.

STRUCTURAL STEEL PENDING

950 tons, municipal penitentiary, Rikers Island, New York; bids Jan. 6.

750 tons, state bridgework, Dauphin County, Pennsylvania, Hempt Bros., Camp Hill, Pa., low on the general contract.

589 tons, state bridgework, Washington County, Pennsylvania; Marsolino Construction Co., Uniontown, Pa., is low on the general contract.

200 tons, state bridgework, Chester County, Pennsylvania, Hempt Bros., Camp Hill, Pa., low on the general contract; about 1500 tons of shapes in other bid items may go to prestressed concrete.

REINFORCING BARS . . .

REINFORCING BARS PLACED

131 tons, dormitory, Ft. Greely, Alaska, to Pacific Coast Div., Bethlehem Steel Co., Seattle; Sound Construction & Engineering Co., Seattle, general contractor.

REINFORCING BARS PENDING

525 tons, state bridgework, Gloucester County, New Jersey, bids Jan. 5; also required are 61 tons of structural steel bearings and 8325 lineal ft of prestressed concrete beams.

500 tons, baseball stadium, Tacoma, Wash.; bids in.

460 tons, tunnel, retaining walls, etc., Seattle freeway; bids to Washington State Highway Commission, Olympia, Wash., Jan. 12.

345 tons, physical education building, Western Washington College, Bellingham, Wash.; Elford Construction Co., Bellingham, low at $868,500.

PLATES . . .

PLATES PLACED

70 tons, stainless steel, liquid oxygen plant, Fairchild Air Base, Washington State, to unstated interest; also 55 tons of structurals to Isaacson Iron Works, Seattle; Sound Construction & Engineering Co., Seattle, general contractor at $357,000.

PLATES PENDING

2700 tons, Kirkland water supply line extension, Seattle; 6 miles of 42 and 36 in. pipe; Coluccio Construction Co., Seattle, is low at $1,269,680 for concrete cylinder, $1,358,330 for steel plate; Cheney Construction Co., Seattle, low at $1,358,333 for steel plate; date of completion is a governing factor.

PIPE . . .

CAST IRON PIPE PLACED

338 tons, various sizes for Renton, Wash., to Pacific States Cast Iron Pipe Co., Seattle.

CAST IRON PIPE PENDING

165 tons, 15,000 ft of 4 and 6 in. for stockpiling; bids to Bellingham, Wash., Jan. 4.

RAILS, CARS . . .

LOCOMOTIVES PLACED

Atchison, Topeka & Santa Fe, twenty-five 2400-hp road switchers, to Alco Products Inc., Schenectady, N. Y.; it also booked ten similar type units for another domestic railroad.

National Railways of Mexico, sixteen 1800-hp and eight 1000-hp switchers to Alco Products Inc., Schenectady, N. Y.

Santa Fe, sixty 2400-hp diesel locomotives costing $15.6 million; 35 to the Electromotive Div., General Motors Corp., La Grange, Ill., 25 to Alco Products Inc., Schenectady, N. Y.

RAILROAD CARS PLACED

Northern Pacific, 100 fifty-ft mechanical refrigerator cars to Pacific Car & Foundry Co., Seattle.

Monon Railroad, 30 covered hopper cars to the Pullman-Standard Div., Pullman Inc., Chicago; to cost $365,000.

FOR SALE

Wheelabrator Cabinet, will clean steel plates, channels, angles, structural steel strips up to 12", inside or outside pipe or tubing 12" x 40' will blast inside and outside. Cabinet unused. Wheelabrator Cabinet will clean steel plates, drums, tubing 3' x 12'.

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Send resume to John Truitt, Personnel Manager

ELECTRO-MECHANICAL RESEARCH, INC.
Sarasota, Florida

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Accounts Wanted

TWO EXPERIENCED MEN selling to steel producing industry are interested in adding one or two lines of equipment sold to this field. Located in Cleveland. Reply Box 811, STEEL, Penton Bldg., Cleveland 13, Ohio.

Help Wanted

WIRE DRAWING FOREMAN wanted by firm manufacturing stainless steel & nonferrous wire, located Newark, N. J. area. Address reply to Box 809, STEEL, Penton Bldg., Cleveland 13, Ohio.

METALLURGICAL ENGINEER in Newark, N. J. area with at least 5 yrs. experience cold rolling of stainless steels & related alloys. Send complete record to Box 812, STEEL, Penton Bldg., Cleveland 13, Ohio.

COLD ROLLING FOREMAN for non-ferrous & stainless wire mfr. located northern New Jersey area. Send reply to Box 810, STEEL, Penton Bldg., Cleveland 13, Ohio.

METALLURGICAL ENGINEER with at least 5 yrs. experience in wire drawing of stainless steels & related alloys needed by mfr. in northern New Jersey area. Send complete record to Box 816, STEEL, Penton Bldg., Cleveland 13, Ohio.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchens, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., $140; Salina, Pa., $145; Niles, Ohio, $138; Cutler, Utah, $175.

Super-Duty: Ironton, Ohio, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Md., St. Louis, $185; Stevens Pottery, Ga., $195; Cutler, Utah, $248.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, Ohio, Hawstone, Pa., St. Louis, $158; Warren, Niles, Windham, Ohio, Hays, Latrobe, Morrisville, Pa., $163; E. Chicago, Ind., Joliet, Rockdale, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Super-Duty: Sproul, Hawstone, Pa., Niles, Warren, Windham, Ohio, Leslie, Md., Athens, Tex., $158; Morrisville, Hays, Latrobe, Pa., $163; E. Chicago, Ind., St. Louis, $168; Canon City, Colo., $183; Curtner, Calif., $155.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $140; Philadelphia, Clearfield, Pa., $145.

Ladle Brick (per 1000 pieces*)

Dry Pressed: Aisey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Vanport, Pa., Mexico, Vandalia, Mo., Wellsville, Irondale, New Salisbury, Ohio, $96.75; Clearfield, Pa., Portsmouth, Ohio, $102.

High-Alumina Brick (per 1000 pieces*)

50 Per Cent: St. Louis, Mexico, Vandalia, Mo., Danville, Ill., $263; Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., $260.

60 Per Cent: St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., $320; Philadelphia, $325.

70 Per Cent: St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., $360; Philadelphia, $365.

Sleeves (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $234.

Dolomite (per net ton)

Domestic, dead-burned, bulk, Bilmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Narlo, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Bonne Terre, Mo., $15.60.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines: Chewelah, Wash., Luning, Nev., $46; ⅝ in. grains with fines: Baltimore, $73.

*—9 in. x 4½ x 2.50 sts.

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60%, $33-$36.50. Imported, net ton, f.o.b. cars point of entry, duty paid, metallurgical grade; European, $30-$33, contract; Mexican, all rail, duty paid $26.50-$27; barge, Brownsville, Tex., $29-$29.50.

Canadian Steel

(Cents per pound, f.o.b. mill, except as otherwise noted)

Billets, Blooms & Slabs:
Carbon, Forging Quality (net ton) $97.00
Alloy (net ton) ... 115.00

Wire Rods:
Carbon, ⅜" to under ¼ in. 5.30
Carbon, ¼ in. to 47/64 in. 5.70
Alloy 6.40

Wire (carload lots) .. 8.40

Bars & Small Shapes:
Carbon, merchant quality 5.40
Carbon, special quality 5.85
Alloy 6.40

Bar Mill Bands:
Carbon 5.40
Alloy 8.05

Structural Size Angles & Zees 5.40

Plates:
Carbon 5.45

Sheets & Coils, Hot Rolled:
Carbon Sheets 5.00
Carbon Strip 5.00

Sheets & Coils, Cold Rolled:
Carbon Sheets 6.35
Carbon Strip (0.080 and lighter) 6.35
Carbon Strip (0.081 and heavier) 6.65

Sheets & Coils, Galvanized:
Standard Quality .. 6.70
Culvert Quality ... 7.00

Sheets, Porcelain Enameling 7.45

Sheets & Coils, Electrical:
Field Grade 9.00
Armature Grade .. 9.50
Electrical Grade .. 10.15

Tin Mill Products (Per Base Box; 100 lb basis wt)
Coke Tin Plate (1.25 lb pot yield) $10.60
Electrolytic Tin Plate (0.25 lb coating) . 9.10
Black Plate 8.30

Nails, c.l. lots, 400 keg min. ..... (per keg) $5.15

Metal Powder

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as noted)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. trucklots, freight allowed east of Mississippi River:	
100 mesh, bags ...	11.50
100 mesh, pails ...	9.85‡
40 mesh, bags	8.10††
Electrolytic Iron,	
Melting stock, 99.87% Fe, irreg. fragments, ⅛ in. x 1.3 in.	28.75
(In contract lots of 240 tons price is 22.75c)	
Annealed, 99.5% Fe .	36.75
Unannealed (99+% Fe)	33.25
Unannealed (99+% Fe) (minus 325 mesh)..	58.25
Powder Flake (minus 16 plus 100 mesh).	29.25
Carbonyl Iron:	
98.1-98.9%, 3 to 20 microns, depending on grade, 93.00-290.00 in standard 200-lb containers; all minus 200 mesh.	
Aluminum:	
Atomized, 500-lb drum, freight allowed, c.l. 38.50; ton lots 40.50	
Antimony, 500-lb lots 42.00*	
Brass, 500-lb lots .....35.70-52.20†	
Bronze, 5000-lb lots .....53.50-57.50†	
Copper, electrolytic ..	14.25*
Copper, reduced	14.25*
Lead	7.50*
Manganese, Electrolytic: Minus 35 mesh ...	$1.00
Nickel	$1.15
Nickel-Silver, 5000-lb lots .....54.00-58.30†	
Phosphor-Copper, 5000-lb lots	66.00
Copper (atomized) 5000-lb lots 46.50-55.00	
Solder	7.00*
Silicon	70.00*
Stainless Steel, 304 ...	89.00*
Stainless Steel, 316 ..	$1.07
Tin	14.00*
Zinc, 5000-lb lots 20.70-33.90‡	
Tungsten:	Dollars
Carbon reduced, 98.8% min, minus 65 mesh .....nom**	
Chromium electrolytic 99.8% Cr, min, metallic basis	5.00

*Plus cost of metal. †Depending on composition. ‡Depending on mesh. §Cutting and scarfing grade. **Depending on price of ore. ††Welding grade.

Ores

Lake Superior Iron Ore

(Prices effective at start of the 1959 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi bessemer $11.60
Mesabi nonbessemer 11.45
Old Range bessemer 11.55
Old Range nonbessemer 11.70
Open-hearth lump 12.70
High phos 11.45

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1959, and increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

Cents per unit, deld. E. Pa.

New Jersey, concentrates .....nom.

Foreign Iron Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 65% .....21.00†
Brazilian iron ore, 68.5% 21.00

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality $17.50-18.00*
Domestic, concentrates, f.o.b. milling points 22.00-23.00

*Before duty. †Nominal.

Manganese Ore

Mn 46-48%, Indian 48-90c, nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1 .....$34.00-35.00†
48% no ratio ..... 25.00-26.00†

South African Transvaal

44% no ratio ..... 18.00†
48% no ratio .....24.00-26.00†

Turkish

48% 3:1 ..... 36.00-37.00†

Domestic

Rail nearest seller

18% 3:1 ..... 30.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked $1.23

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

50-55% $2.35-2.50
60-65% 2.60-3.20

Vanadium Ore

Cents per lb V_2O_5

Domestic 31.00

†Nominal.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa., furnace $14.75-15.25
Connellsville, Pa., foundry 18.00-18.50

Oven Foundry Coke

Birmingham, oven $30.35
Cincinnati, deld. 33.34
Buffalo, ovens 32.00
Detroit, ovens 32.00
Pontiac, Mich., deld. 33.95
Saginaw, Mich., deld. 35.53
Erie, Pa., ovens 32.00
Everett, Mass., ovens: New England, deld. 33.55*
Indianapolis, ovens 31.25
Ironton, Ohio, ovens 30.50
Cincinnati, deld. 33.54
Kearny, N. J., ovens 31.25
Milwaukee, ovens 32.00
Neville Island (Pittsburgh), Pa., ovens 30.75
Painesville, Ohio, ovens 32.00
Cleveland, deld. 34.19
Philadelphia, ovens 31.00
St. Louis, ovens 33.00
St. Paul, ovens 31.25
Chicago, deld. 34.68
Swedeland, Pa., ovens 31.00
Terre Haute, Ind., ovens 31.25

*Within $5.15 freight zone from works.

Imported Steel

(Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. Source of shipment: Western Europe)

	North Atlantic	Great Lakes*	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305 ..	$6.75	....	$6.70	$6.60	$7.06
Bar Size Angles	6.45	....	6.40	6.30	6.76
Structural Angles	6.35	....	6.30	6.20	6.66
I-Beams	6.35	....	6.30	6.20	6.66
Channels	6.35	....	6.30	6.20	6.66
Plates (basic bessemer)	6.60	....	6.65	6.55	6.95
Sheets, H.R.	9.50	....	9.45	9.35	9.75
Sheets, Galvanized, 20 Ga., 36 in. x 96 in. ...	11.00	....	10.95	10.85	11.25
Sheets, Galv. (in coils) 20 Ga., 48 in. wide ..	11.00	....	10.95	10.81	11.25
Sheets, C.R. (drawing quality)	12.00	....	11.95	11.85	12.25
Furring Channels, C.R., 1000 ft, ⅞ x 0.30 lb per ft	26.00	....	25.74	25.50	27.12
Barbed Wire (†)	8.25	....	8.20	8.10	8.50
Merchant Bars	6.45	....	6.40	6.30	6.76
Hot-Rolled Bands	9.50	....	9.45	9.35	9.75
Wire Rods, Thomas Commercial No. 5	6.60	....	6.45	6.45	6.70
Wire Rods, O. H.	7.05	....	6.90	6.90	7.15
Bright Common Wire Nails (‡)	8.25	....	8.20	8.10	8.50

*Books closed for 1959-60 shipping season. †Per 82 lb net reel. ‡Per 100-lb keg, 20d nails and heavier.

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.

Pure benzene 31.00
Xylene, industrial grade 29.00
Creosote 24.00
Naphthalene, 78 deg. 5.00
Toluene, one deg (deld. east of Rockies) . 25.00

Cents per lb, f.o.b. tank cars or tank trucks, deld.

Phenol, 90 per cent grade 14.75

Per net ton bulk, f.o.b. cars or trucks, plant

Ammonium sulfate, regular grade $32.00

TO FIND THE MAN YOU NEED . . .

Place an advertisement in the "Help Wanted" columns of STEEL's classified pages. Your advertisement will reach the qualified men you need, because STEEL is addressed to highly-trained men in all phases of metalworking

STEEL
The Metalworking Weekly

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things are popping at

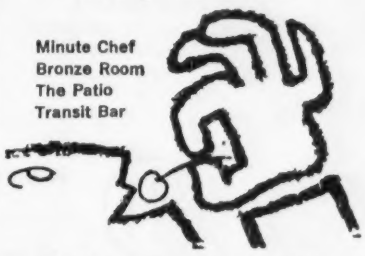
SHERATON-CLEVELAND HOTEL

- 100% air-conditioning of all guest rooms, restaurants, and function rooms.
- Major room redecoration (both guest and function rooms).
- Free radio and television in all guest rooms.
- Interior and exterior modernization.
- Now "Reservatron" — World's first electronic hotel reservations service reserves and confirms your reservations in a split second in Sheraton cities from coast to coast in the USA, Canada and Hawaii.
- Many new convention innovations and banquet facilities.
- Modern new Presidential Suite.
- New stores and guest services.
- New charcoal grill specializing in steaks, ribs and chops.
- New popular priced coffee shop "The Minute Chef"—for busy people.
- And many more new developments.

SHERATON-CLEVELAND HOTEL

meal time
night time
any time

Minute Chef
Bronze Room
The Patio
Transit Bar



Public Square • Cleveland, Ohio
TOwer 1-8000

Corrosion resistance increased up to 500% by M&T's "DUPLEX CHROMIUM"

Durability of chromium plated parts in severe, accelerated corrosion tests has been increased up to 500% by the revolutionary Unichrome "Duplex Chromium" Plating Process developed by Metal & Thermit.

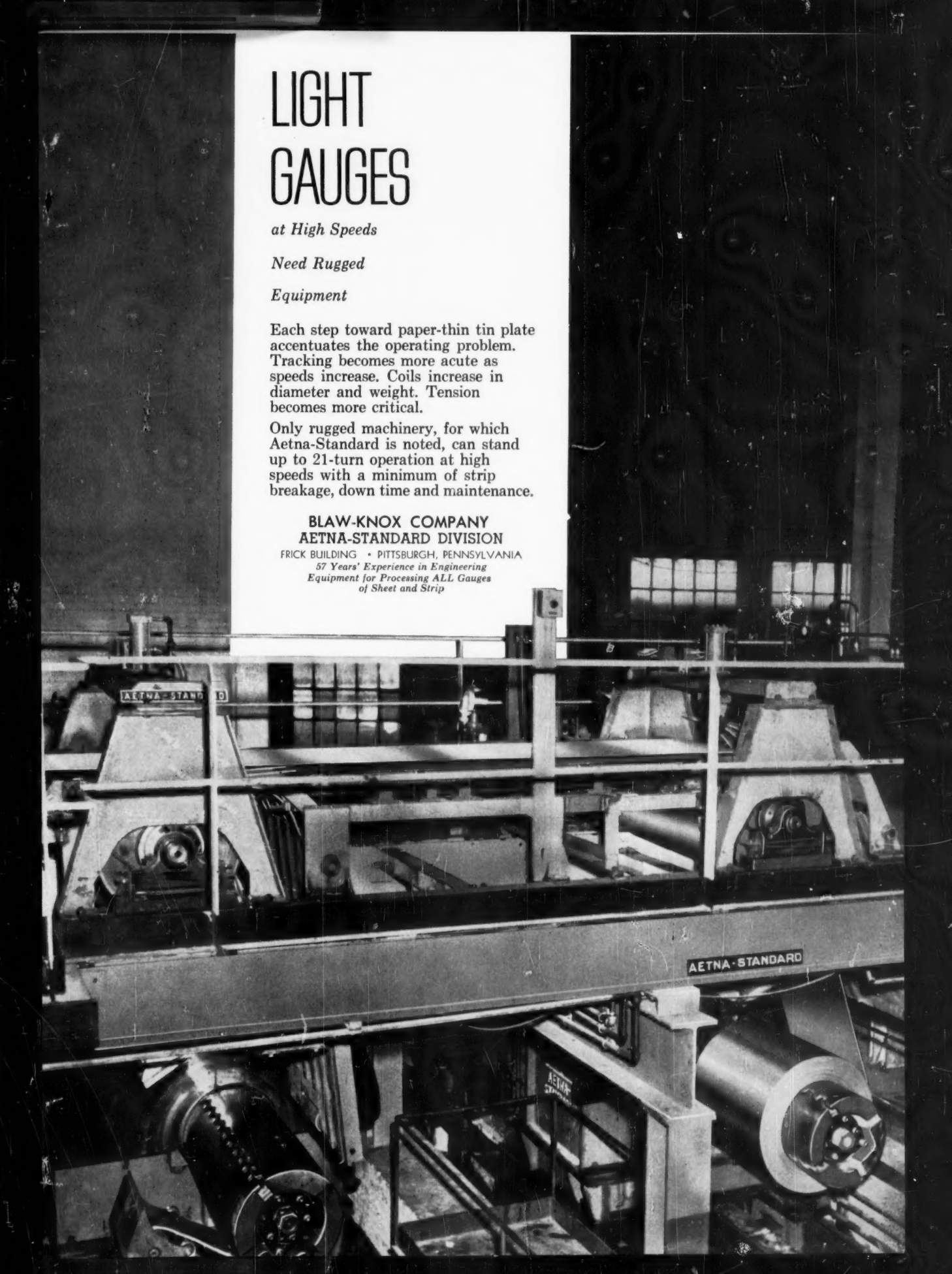
Adding only 50 to 100 millionths of an inch more chromium, in two layers, does more for outdoor durability than any other change in present plating procedure. Results show that per dollar invested in equipment and solutions, this new technique gives greater benefits than a corresponding expenditure for thicker copper and nickel undercoats. It saves on capital investment because existing production equipment can be used with minor modifications. It saves by cutting rejects of parts which are now required to survive more rigorous accelerated life tests.

Simply by adding the few additional minutes to plating time and using M&T "Duplex Chromium", you can add *years* to the life of chromium plated finishes in outdoor exposure. Send for data. Or ask the M&T Man about it.

M&T

plating products · welding products
coatings · metals · chemicals

METAL & THERMIT CORPORATION, General Offices: Rahway, New Jersey



LIGHT GAUGES

at High Speeds

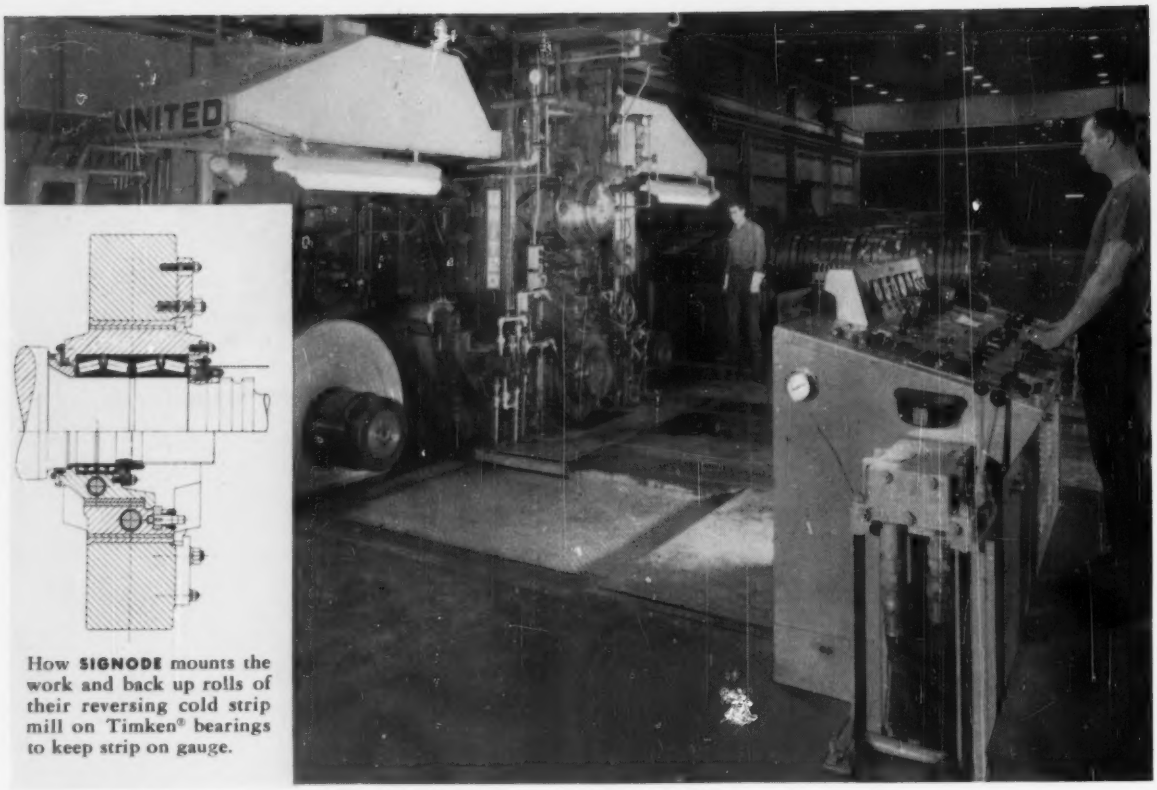
Need Rugged

Equipment

Each step toward paper-thin tin plate accentuates the operating problem. Tracking becomes more acute as speeds increase. Coils increase in diameter and weight. Tension becomes more critical.

Only rugged machinery, for which Aetna-Standard is noted, can stand up to 21-turn operation at high speeds with a minimum of strip breakage, down time and maintenance.

BLAW-KNOX COMPANY
AETNA-STANDARD DIVISION
FRICK BUILDING • PITTSBURGH, PENNSYLVANIA
57 Years' Experience in Engineering Equipment for Processing ALL Gauges of Sheet and Strip



How **SIGNODE** mounts the work and back up rolls of their reversing cold strip mill on Timken® bearings to keep strip on gauge.

Signode's new strip mill controls gauge to .0001" by X-ray Timken® bearings keep it on gauge

THIS new 4-high cold strip mill built by United Engineering & Foundry for Signode Steel Strapping Company has a special X-ray gauge that measures and records strip thickness to .0001". And mounting the work rolls, back up rolls, reel and screw down on Timken® tapered roller bearings helps keep this 11¼" and 29¼" by 20" reversing cold mill turning out strip on gauge—gives Signode maximum economy, assures customers strapping of uniform gauge.

Steel mills the world over use Timken roll neck bearings because they:

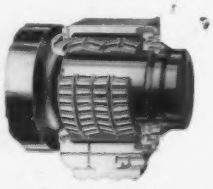
1) *Require minimum maintenance.* Timken bearings are tapered and provide the high radial and thrust capacity required by modern steel mill operations.

2) *Give long life.* Rollers and races are case-carburized to produce hard, wear-resistant surfaces over tough, shock-resistant cores. In some mills, Timken balanced proportion bearings have rolled over 5,000,000 tons of steel.

Timken bearings practically eliminate friction, cut starting resistance so that scrap losses are held to a minimum. They can be grease or oil mist lubricated to cut lubricant costs to the bone. It all adds up to the lowest bearing cost per ton of steel rolled. It's why Timken bearings are on the roll necks of 1,008 mills.

Be sure to get all these advantages when you buy or build a mill. Specify Timken tapered roller bearings and get the best in engineering service, the best in bearings. That's Better-ness. Timken bearings are the symbol of Better-ness in machines. ***When you buy Timken® bearings you get . . .***

1) Quality you can take for granted.
2) Service you can't get anywhere else.
3) The best-known name in bearings.
4) The pace setter in lower bearing costs. The Timken Roller Bearing Company, Canton 6, Ohio. Makers of Tapered Roller Bearings, Fine Alloy Steels and Removable Rock Bits. Canadian plant: St. Thomas, Ontario. Cable: "TIMROSCO".



First in bearings for 60 years

BETTER-NESS rolls on

TIMKEN®

tapered roller bearings